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TELEPHONE ENGINEER & MANAGEMENT

the telephone industry magazine

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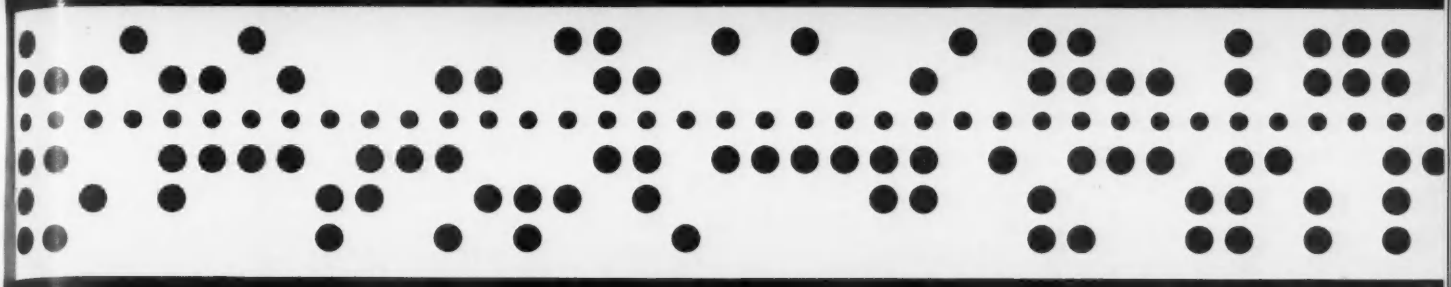

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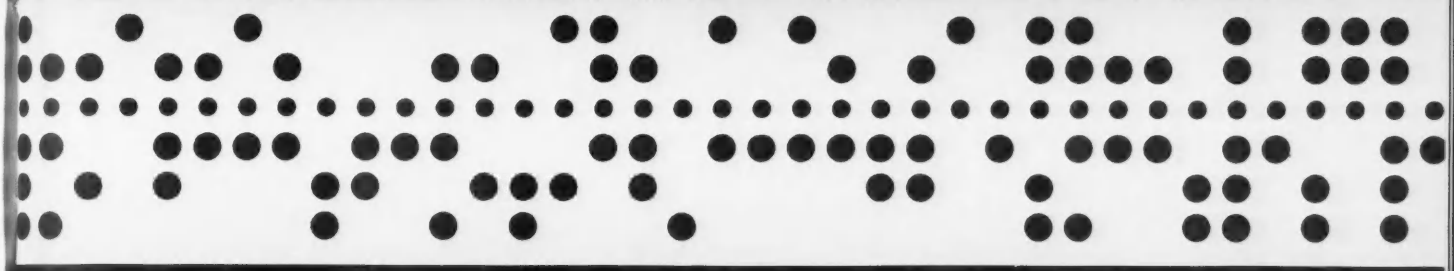
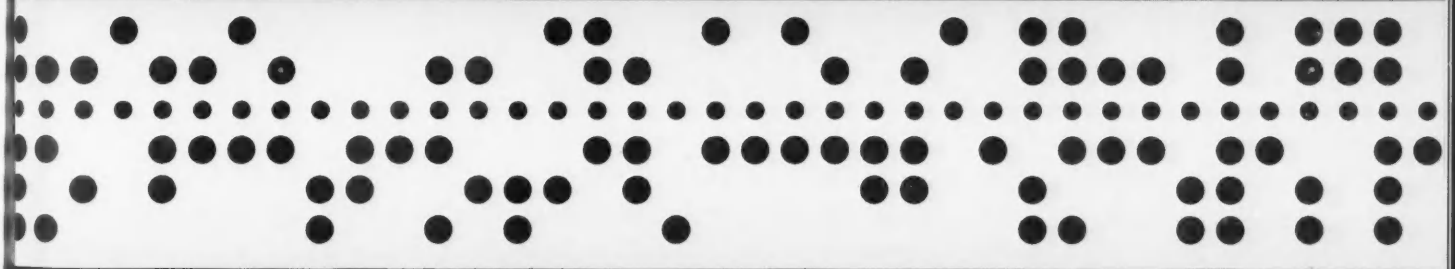


Word Counters · Circuit Timers



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Here he is, doing another job with Strandvise...
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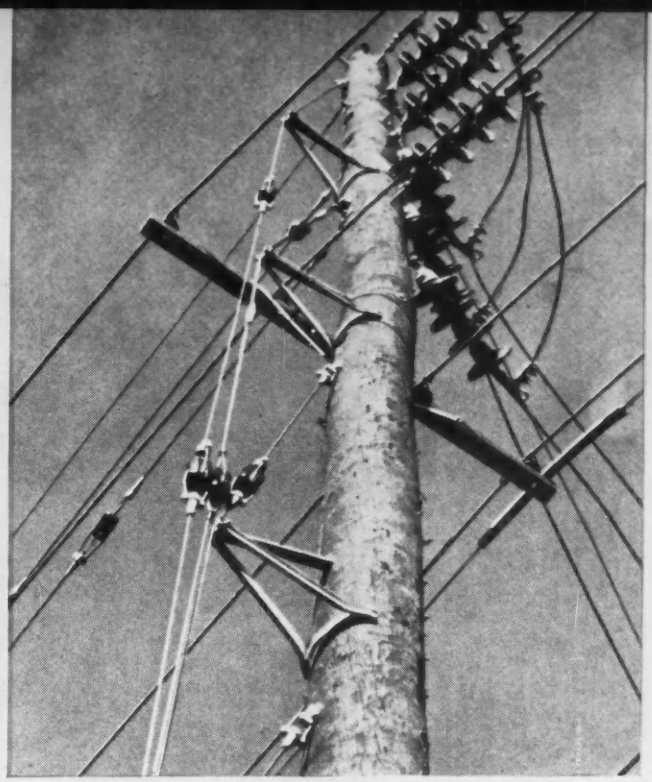
Head-guys and

down-guys

the Strandvise way



The fourteen Strandvises on these lines saved someone three to four $MH (man-hours).

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More and more utilities are using Strandvise . . . the feed-through deadend that lets *one man* put up a guy in five short minutes. No tensioning tools are used until the guy is complete . . . just as easy for double or triple guys.

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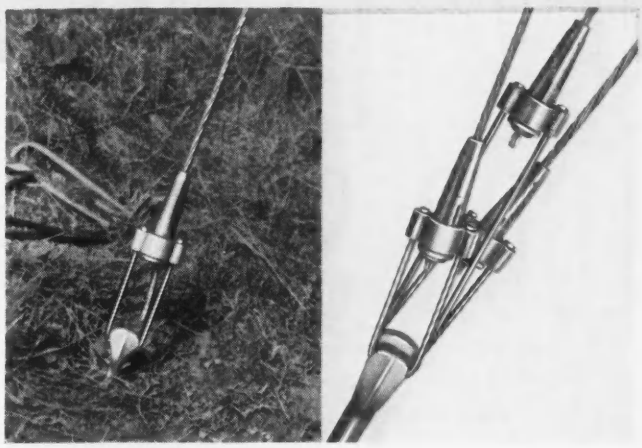

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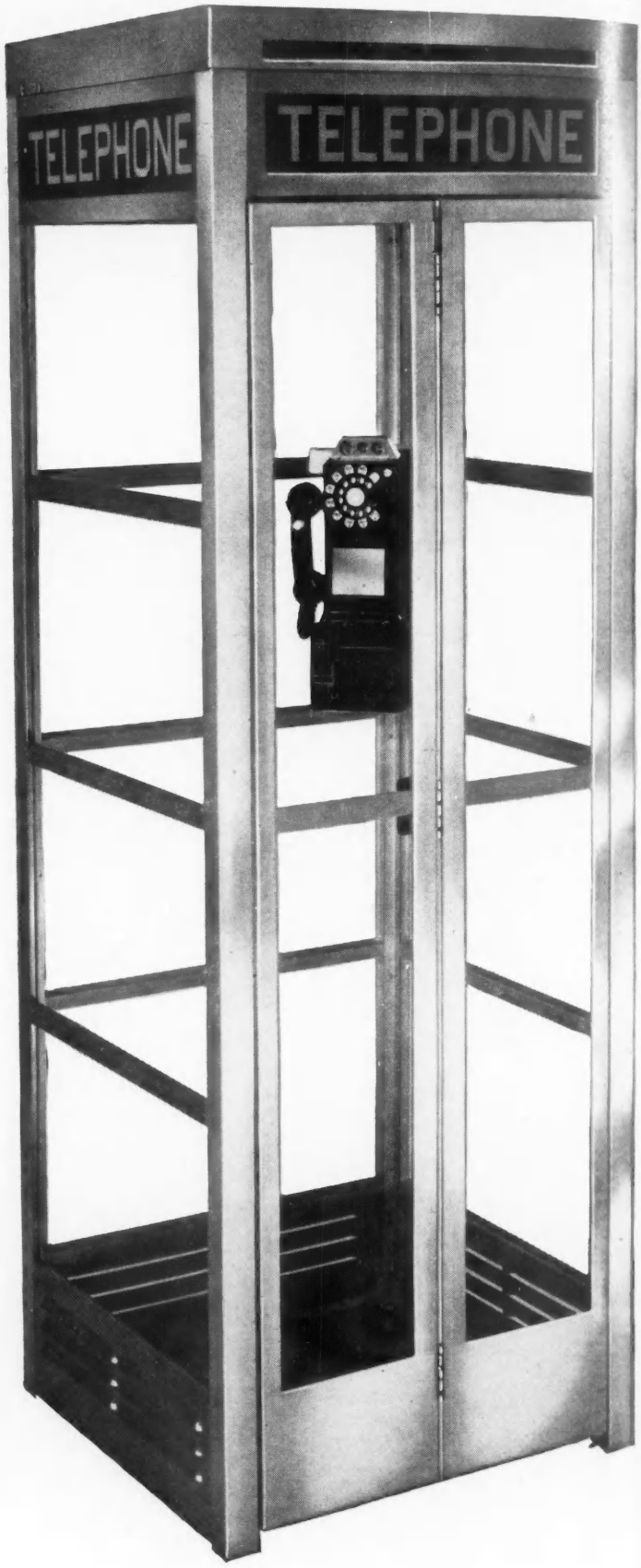


Fits where no booth ever fitted before . . . stacks closer in high-revenue locations!

This new Alcoa® Aluminum "Compact" indoor booth adds revenue by providing convenient service with complete privacy in places no booth ever fitted before. Just 28¾ in. square, it takes 26 per cent less area than its bigger brother . . . saves valuable floor space in supermarkets, drugstores, office buildings, department stores and other busy locations.

Its flush roof lets the Alcoa "Compact" booth stack closer in tandem where traffic dictates to earn more revenue per square foot of floor space than any booth made before. Designed to harmonize with modern decor, the Alcoa "Compact" booth attracts passers-by with its clean appearance and slim lines. Ceiling vent fan and louvered bottom panel are optional.

Maintenance: minimum! Solidly built of heat-treated Alcoa Aluminum Extrusions, the Alcoa "Compact" booth resists damage and vandalism. Alumilite* finish stays bright and shiny with just an occasional washing down.

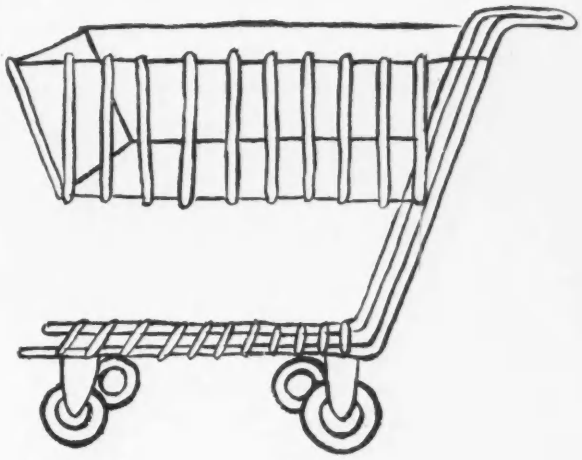
*Trade Name of Aluminum Company of America

Contact your telephone supply jobber for more information on the new Alcoa "Compact" indoor booth, or write for free folder: Aluminum Company of America, 1721-F Alcoa Building, Pittsburgh 19, Pa.

ALCOA ALUMINUM

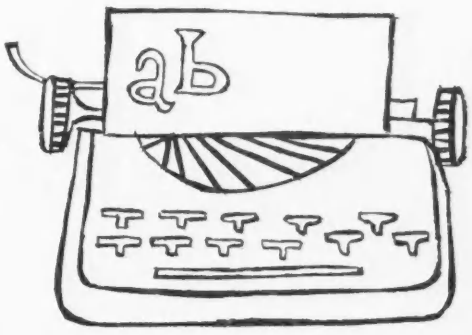
ALUMINUM COMPANY OF AMERICA

Alcoa "Compact" telephone booth goes where revenue is high:

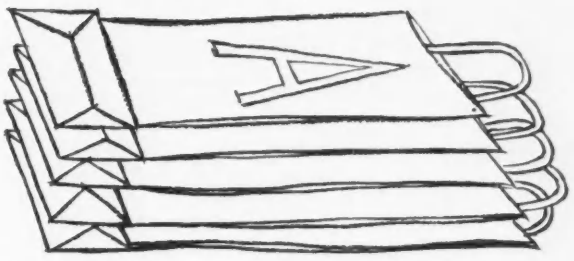


Supermarkets

Drugstores



Office Buildings



Department Stores

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TELEPHONE ENGINEER & MANAGEMENT

the telephone industry magazine

VOL. 64 NO. 11

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The TE&M Front Cover

Jim Counts' excellent drawing tells its own story. It very capably illustrates a fact mentioned in the TE&M editorial "That Excise Tax Expiration Date" (TE&M, Jan. 15, 1960, page 41). At that time TE&M warned — "Unless an upsurge of efforts comes about and produces a continual flow of letters to Washington that will impress each Congressman with the fact that the people back home are expecting him to do his part to produce the complete elimination of excise taxes on telephone services, we think that old one about the chances of a snowball's survival in July aptly applies to the June 30th termination date for the excise tax on local telephone service!"

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- New, improved dial
- New, improved ringer
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*Your North sales representative can PROVE this!

The finest two-piece telephones are available from

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...hat sells itself...

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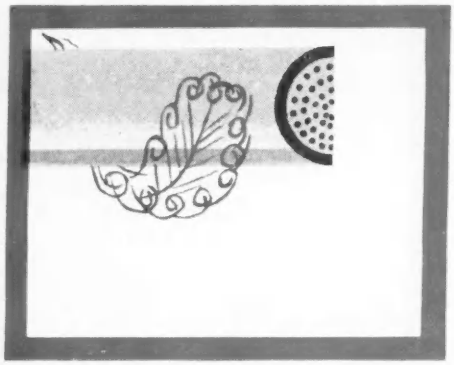
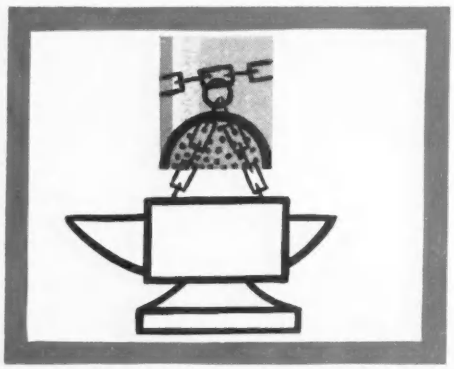


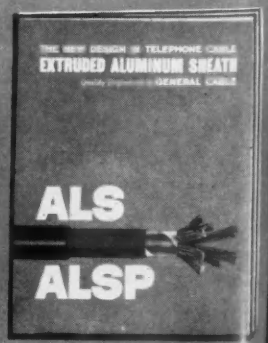
Light-as-a-feather aluminum possesses high tensile strength, permitting less sheath thickness than lead. The result is a much lighter sheath—as light, in fact, as plastic sheath.

ALUMINUM IS STRONG!



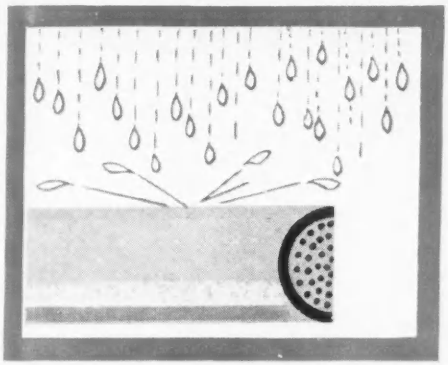
The sheath on aluminum is many times stronger than the sheath on lead or plastic cable. This permits greater pulling stresses, provides better protection from mechanical damage.

FREE! **Aluminum Sheath Catalog—** This brand new catalog includes complete details on General Cable's aluminum sheath cable. Gives full engineering data and color codes. Tells how to handle, install and splice; lists tools necessary for installing. Gives full ordering information. For your free copy, write Automatic Electric Sales Corporation, Northlake, Illinois.



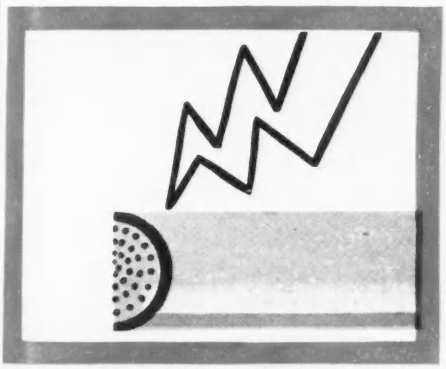
SHEATH

ALUMINUM IS IMPERMEABLE!



Extruded aluminum is seamless. A single tube is fitted tightly over the cable core—moisture cannot seep through! Aluminum sheath protects your cable for more years of service.

ALUMINUM IS HIGHLY CONDUCTIVE!



Aluminum conducts electricity eight times better than lead, Alpeth or Stalpeth. Lower sheath resistance gives better protection from lightning and other electrical disturbances.

Buy General Cable Aluminum Sheath from *AE*—AE supplies extruded aluminum sheath telephone cable in a wide variety of constructions. For direct burial, or installations in seacoast locations or industrial atmospheres, a special polyethylene jacket can be supplied for protection against corrosion. Order from your AE sales representative.

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GENERAL SYSTEM

WASHINGTON OBSERVATIONS

By ROLAND DAVIES
and FRED HENCK

U. S. Military communications will be operated by a single manager, rather than by the three armed forces.

THE MILITARY communications systems of the United States — described by the Defense Department as the third largest in the world after those of the Bell System and the Soviet government — will within a year be operated by a single manager, rather than by the three armed services separately, as the result of orders issued by Secretary of Defense Thomas S. Gates, Jr.

Acting at the urging of Congress, which has been prodding the Defense Department for more than a year to bring the communications systems of the Army, Navy and Air Force under control of one office, Mr. Gates has established a Defense Communications Agency which will be responsible for all the "long-haul" communications requirements of the armed forces. The agency head, to be a top-ranking military officer, will, as director of the Defense Communications System, hold down a post that will have an important bearing on all communications operations of the United States, at home and overseas.

Mr. Gates' directives appear not to produce any radical changes immediately in the operation of military communications systems. Programs in the state of development are to be carried out, systems in operation will continue to function in their present manner, and the organizations responsible for communications will continue in being: the directorates of communications in the Air Force and Navy, the Signal Corps, the J-6 Directorate for communications-electronics of the Joint Staff, Joint Chiefs of Staff, and the Office of the Director of Telecommunications Policy in the Office of the Assistant Secretary of Defense (Supply & Logistics).

No economies are expected to result, either, from the elimination of any existing communications systems of any one of the individual services because routes parallel and appear to duplicate the systems of others.

A Pentagon official said, however, the establishment of the DCA should produce economies in the future because of increased efficiencies in programming. The DCA, it was explained, will not result in cutbacks, but it should level off the rate of increase of communications systems requirements, which have been rising at a ratio far in excess of the total defense budget.

The Defense Communications System will include "all worldwide, long-haul government-owned and leased, point-to-point circuits, terminals, control facilities and tributaries" required to meet military needs.

The DCS will not include tactical communications which are self-contained within tactical organizations; self-contained information gathering, transmitting and or processing facilities which are normally local in operation and use; weapons systems requirements which cannot be met through the facilities of the DCS; and land, ship, or airborne terminal facilities of broadcast, ship-to-ship, ship-to-shore, and ground-air-ground systems.

The military communications networks now encompass 79 major relay stations scattered throughout the world representing a plant investment of $2 billion. The combined annual message traffic handled by the three military systems which are to be integrated into a single communications system, currently is in excess of 63,000,000 messages per year.

The systems of today involve 6,352,000 channel miles of leased wires and 489,000 high quality long-range voice channels. To provide some idea of the magnitude of the traffic, the Air Force high frequency radio alone is 14 times greater than the Radio Corp. of America system, has three times as many people, and handles 20 times as much traffic.

The military departments' communications systems now employ about 24,700 personnel.

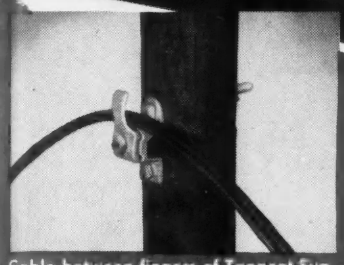
ON THE SUBJECT of military communications, an Air Force official has forecast that the armed forces are looking forward to practical systems of

Please turn to page 16

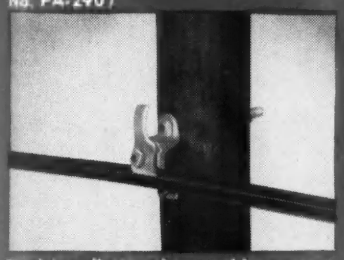
NOW! Telephone cable that installs up to 4 TIMES FASTER!

SUPERIOR I. M. CABLE

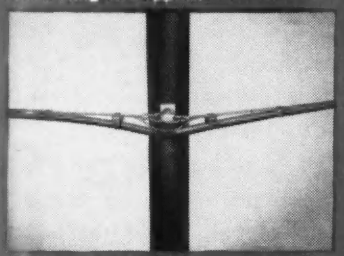
Supported Exchange Type



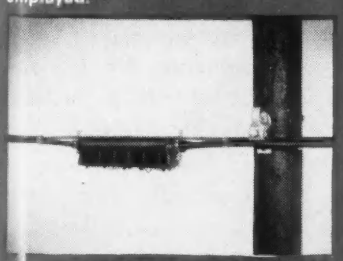
Cable between fingers of Tangent Support. (Malleable Iron Fittings Co. Cat. No. PA-290)



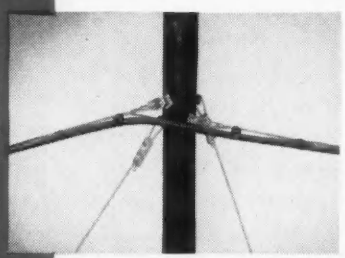
Final installation shows cable messenger firmly gripped between the jaws of the Tangent Support.

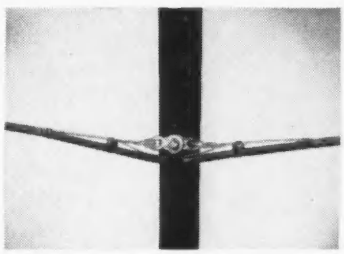


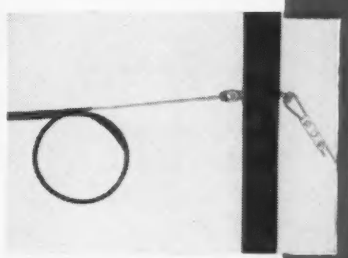
Left to right, photos show methods for corners to 90° and dead end installations. Standard pole line hardware is employed.



Terminal installation on Superior IM Cable.







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satellite communications in the 1965-67 period, and said that such satellite systems would offer many channels of broadband communications for ground-to-ground, ground-to-ship, ground-to-aircraft, and ship-to-ship communications.

Brig. Gen. John B. Bestic, Deputy Director of Communications-Electronics of the U. S. Air Force, also declared that the potential value of satellites as a means of communications seems almost unlimited. "However, before satellite communications systems can be considered competitive with present systems, we must solve several problems," he added.

"The principal problem is to build a long life and reliability into satellites. . . . We can anticipate solving the problem and then there will be a great potential for the development of operational satellite communications systems in several areas," he stated.

The Air Force communicator also said that the "increased spohistication of our weapon systems is making it more and more necessary that we have nearly infallible broadband communications systems. Because of the increasingly quick reaction time of weapons and because we need effective intelligence, we must have the utmost reliability in our circuits. Whether we achieve this reliability by redundancy or by alternative means is immaterial. We must have it. Video bandwidths appear to be needed for the effective operations of all our forces."

QUESTION of whether Federal Communications Commission policies in the domestic public land mobile radio field are healthy for the miscellaneous common carriers as competitors for telephone companies providing common carrier radio service was raised during oral argument recently on FCC Examiner Herbert Sharfman's initial decision of last August looking toward granting the applications of two persons for common carrier one-way signaling radio services at Los Angeles and Santa Ana, Calif.

In arguing the case before the full FCC, Washington Attorney Jeremiah Courtney, appearing on behalf of one of the applicants, declared that the "large question" presented by the case is: "Are you going to promote competition between miscellaneous common carriers serving the same area, or are you going to promote competition between the responsible and qualified miscellaneous common carrier against the telephone company?"

Mr. Cortney, commenting on Examiner Sharfman's reference to his client as a "monopolist" in the Los Angeles area in the MCC busines, since he already has assigned one paging frequency in the area, said the examiner's decision presents a "divide and conquer blueprint for the destruction of the miscellaneous common carrier service." He declared that if the FCC's policy calls for division of frequencies among the MCCs in an area, it doesn't "give any one of them the muscle to improve and really compete with the telephone company."

PRELIMINARY planning for an inter-American communications system with three major networks was completed recently at a conference in Mexico City of the CCITT (international telecommunications consultative committee) under the auspices of the Organization of American States and its Inter-American Economic and Social Council.

Principal decisions of the representatives of 11 countries who participated actively in the sessions consisted of recommendations for further studies of the many aspects of such a widespread communications system, and recommendations for an organizational structure which, when put into effect, will coordinate the design, construction, and operation of the system.

The conferees recommended that each nation involved set up a national committee for the project by July 1. One person from each country will form a temporary preparatory committee, under the proposal.

In view of the U. S. position as a nation in which telecommunications services are operated by private industry, it was made clear that the U. S. will not become a member of the formal organization to be established. All operating arrangements will be made with the private companies, it was emphasized.

Preliminary plans call for one network from the U. S.-Mexican border through the Central American nations to Columbia. There, one branch would go along the north coast of South America through the Guianas to Brazil; another would pass through Bolivia, Ecuador, Peru, Chile, and Argentina. Another network would go through the Antilles into Venezuela from Florida. Still another would go from Yucatan Peninsula to Cuba.

In essence, there would be three circles — one from Florida and the Yucatan; another from northern South America; and the third through the remainder of South America.

FEDERAL Communications Commissioner-designate Edward K. Mills, Jr., has asked President Eisenhower to withdraw his nomination as a Commissioner.

Mr. Mills was quoted as saying that he had done "everything possible" to divest himself of stock holdings which would come under the "financial interest" ban in the Communications Act but that this "still was not regarded as sufficient."

Mr. Mills' difficulty stems from his efforts to eliminate any question of conflict of interest. He is the beneficiary of a trust establsihed by his late father, and asked the trustee, a New Jersey bank, to divest it of any communications securities. The trustee sold some securities but has refused to dispose of others for tax and price reasons. Mr. Mills and his wife, meanwhile, disposed of securities they held personally which had any connection with communications, and he has been commended for his positive approach to the problem and his frankness in raising the question himself when his confirmation hearing was held by the Senate Interstate & Foreign Commerce Committee.

—Roland Davies and Fred Henck.

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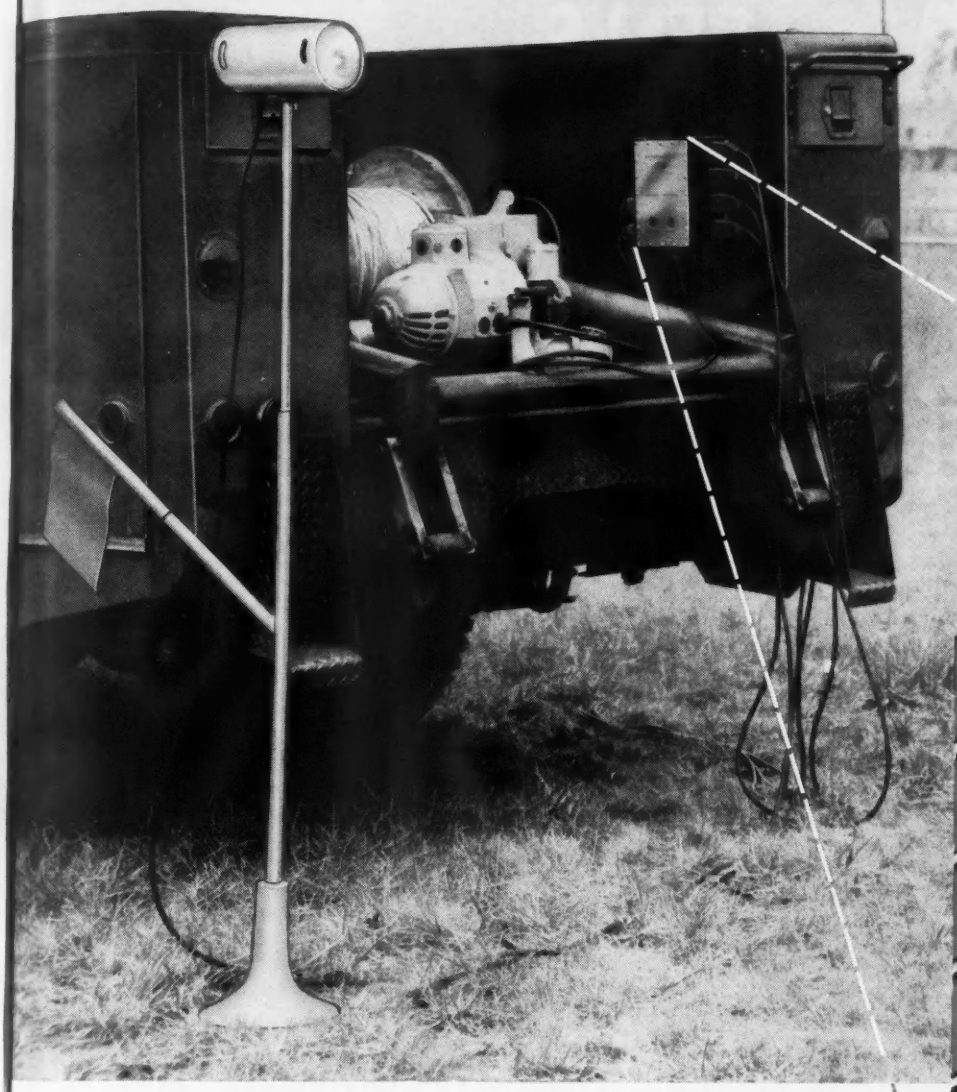

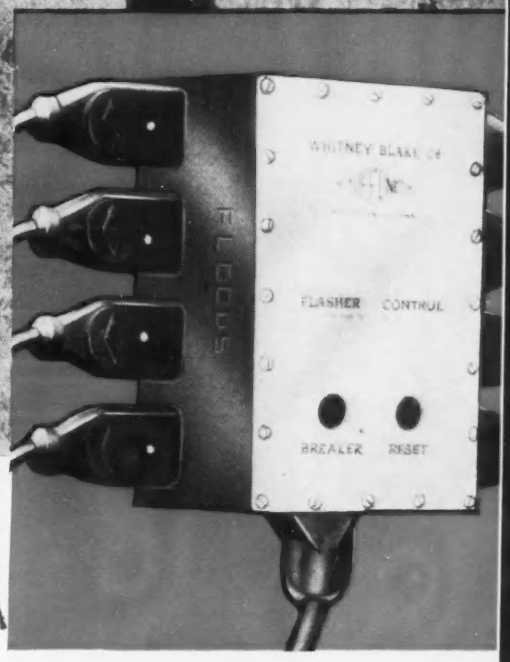

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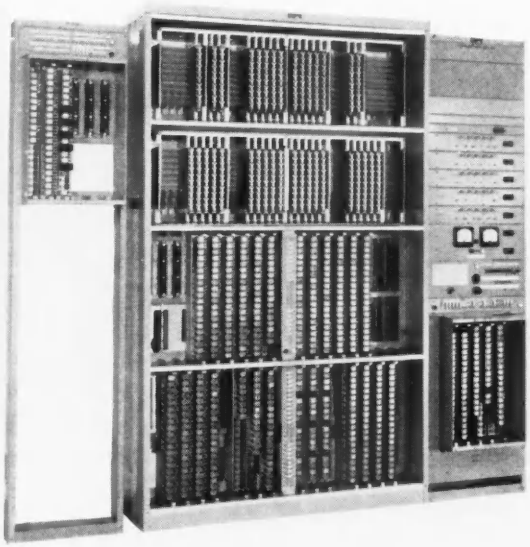

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INDUSTRY OBSERVATIONS

By L. A. GRITTEN

More And More For Less And Less

THE COMMUNICATIONS Workers of America will again demand more wage increases, regardless of revenues, profits, man-hour production or any other consideration, including the ultimate well-being of the unions themselves. Their 1960 bargaining program also includes health insurance, paid for entirely by the company, increased pensions and two weeks vacation after one year of service.

They may get what they want. The big employers in this country may hate the thought of more inflation, but compliance — at the ultimate expense of the fellow who pays the bill — is easier than strife. Battling with unions is not an alluring prospect, after the letdown accorded to the steel companies last year by the Government, even while the President was declaiming against inflation.

For how long — and then what? Nobody knows, but the uneasy stock market dithers may indicate that many people are guessing. Continuing wage inflation, and consequent loss of business to foreign competitors, cannot march forever with our superlative standards of living. Here are a few of the straws in the wind:

Four years ago we exported four times as many automobiles as we imported. Now our imports are four times our exports — and Detroit is officially declared a "labor surplus area."

A few months ago the great General Electric of Schenectady was beaten at its own game. It lost a 500,000 KW generator contract to a British firm.

Imports from Western Europe in the first half of 1959 increased by more than 40 per cent. Profits (after taxes) of U. S. industries dropped from 9.2 per cent in 1947 to 6 per cent in 1957.

The combination of over-greedy unions, too easily compliant employers, and political pressures based on votes at the next election are pricing this country right out of its commercial supremacy. "We never had it so good" — nor so perilously close to something not so good.

Nature's Rhythms

AN ARTICLE by Frank A. Brown Jr. in the *Northwestern Tri-Quarterly* — "The Deep Mystery of Nature's Rhythms" — is unusual and fascinating. It deals with cycles of behavior affecting our lives but quite unsuspected by the ordinary man.

We learn of birds that fly 30 miles every day to feed at a beach at dead low tide. That condition occurs fifty minutes later every day, but the birds always arrive exactly on time.

In some extraordinary way, the metabolism of the lowly potato varies in regard to barometric fluctuations of the day before. The life of a crab is synchronized with cosmic rays. And so on, in a million mysterious sequences that may control our own actions in ways that science has yet to learn. ***Please turn to page 22***

"CHARLIE," by Jim Counts

HOW DO YOU LIKE LINE WORK BY NOW, CHARLIE?
JUST FINE, MR. POTTS, BUT I'D SURE LIKE TO CLIMB SOME!
O.K. YOU CAN START RIGHT NOW!
TH' ONLY THING YOU CAN CLIMB LIKE THAT IS THE INSIDE OF A HOLLER TREE!
Jim Counts

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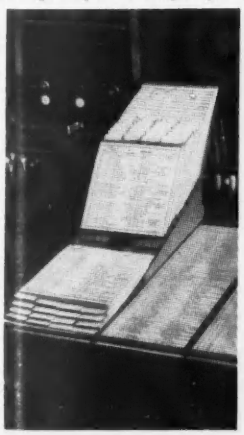
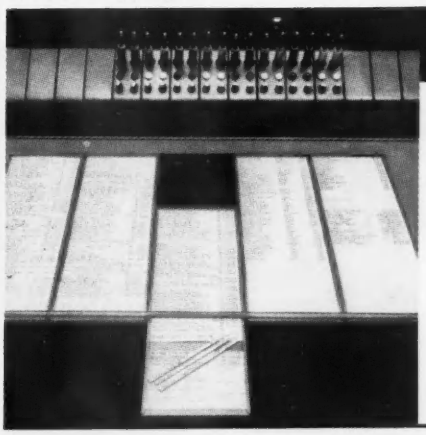


Each Flexoline panel can be independently removed without removing plexiglass.



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(Concluded from page 20)

Some such periodicity may account for these waves of utility baiting, when normally tolerant and happy John Does, who blithely pay $80 for a suit of near-shoddy, or $4 for six bits worth of steak, suddenly feel an urge to emote and rant at meetings, because their telephone bill is raised a few cents. If our scientists could discover the rhythm that governs such tendencies, perhaps our public relations cognoscenti could beat the rhythm to the draw.

How To Make An Enemy

TAKE A gal who has enjoyed 2- or 4-party service for a long time, without anyone else on her line. There are some in every exchange. Then, without notice to her, fill up her line with people who talk and talk and talk.

You now have an enemy! Quite illogical, of course. She should realize that she has been lucky to get individual service at a party line rate for all these months; but that doesn't occur to her. She hates you — and she tells the world about it.

It is much cozier to call her up first, explain the facts of life to her and sell her a main line service. Some do — but too many companies don't bother.

Wiretap Chaos

THE wiretap muddle elicits two opposing views; and many of us apparently want to take both sides at once. One says that we must retain privacy of communication at all costs and uphold Section 605 of the Federal Communications Act. Despite state legislation, says the U. S. Supreme Court, under that law it is a crime for law officers to use wiretapping to enforce local laws.

The opposite view is that the federal law muzzles law enforcement, helps the criminals, and should be repealed.

Between these conflicting ideas lies a hideous legal mess. Every state has different laws and different practices; in the light of the recent Supreme Court decision many of them are unconstitutional and illegal. Congress should stop its vote-catching long enough to do something constructive about the "wiretap SNAFU."

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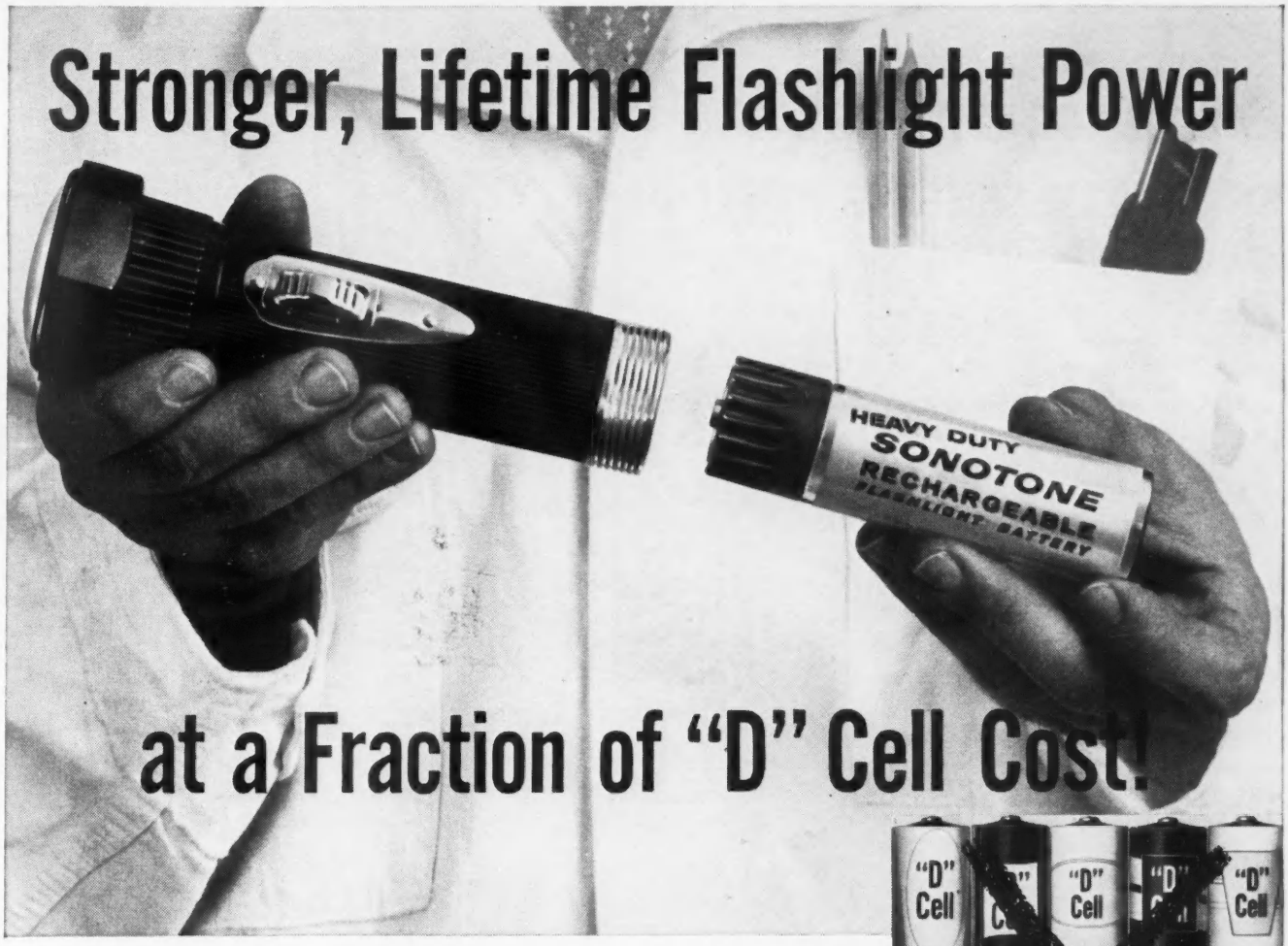

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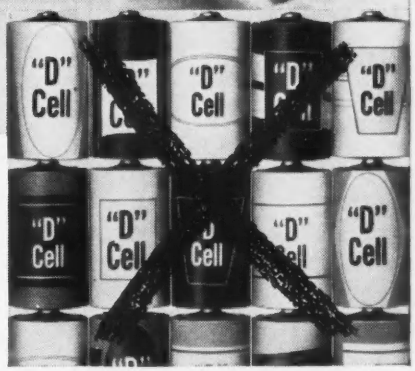

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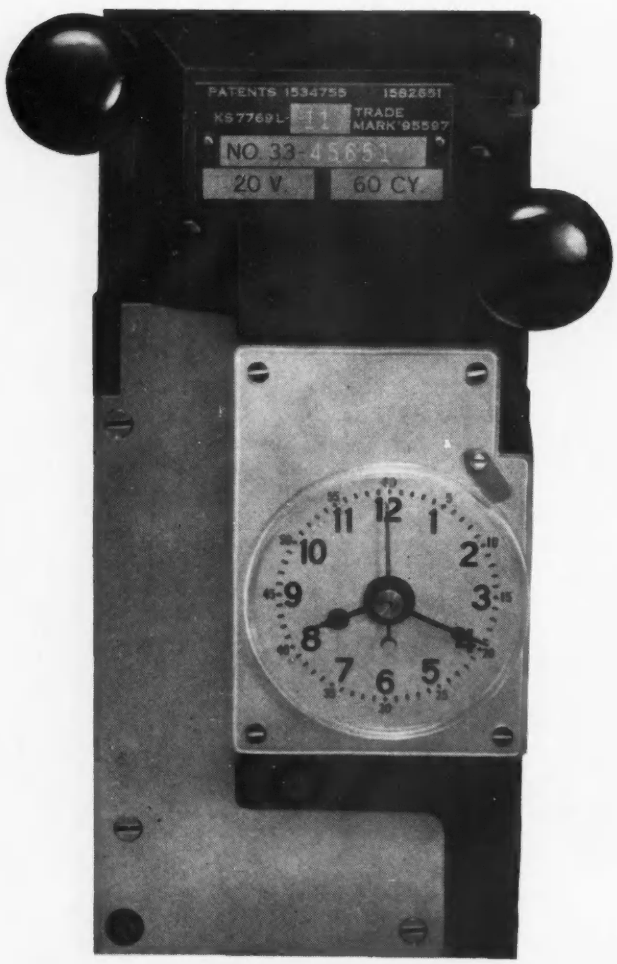
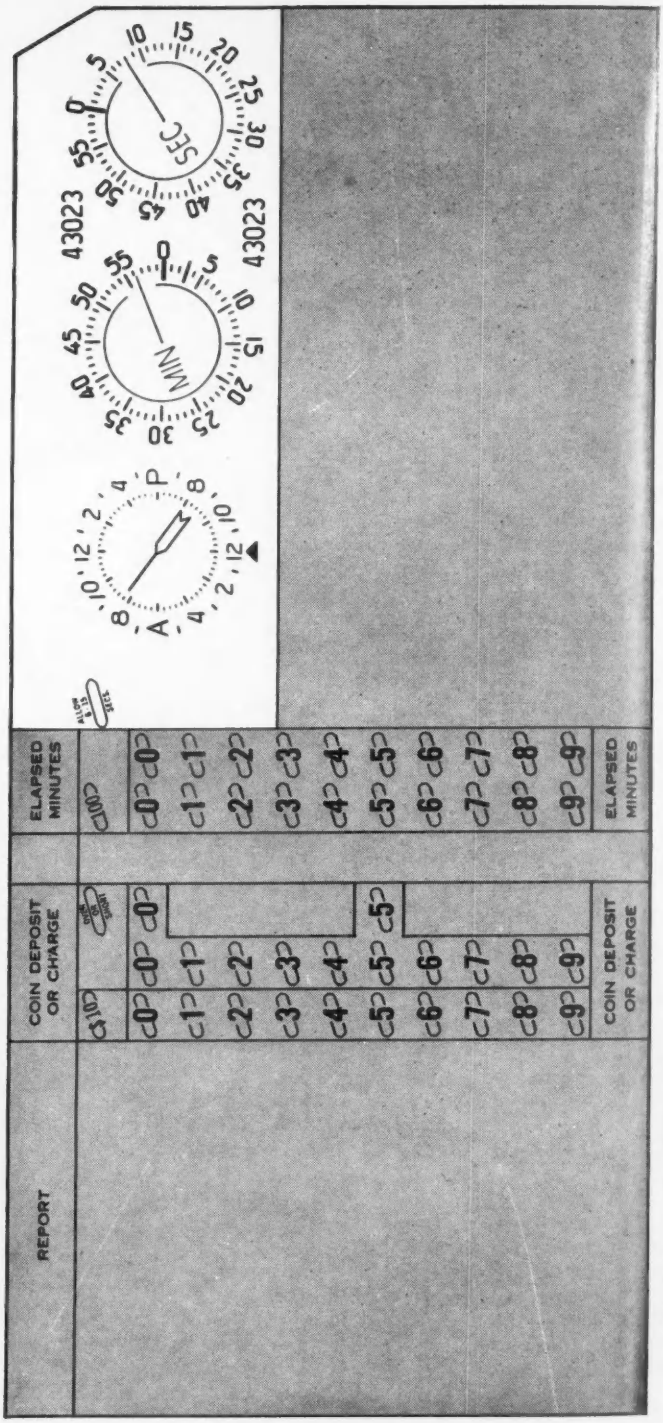
If your analysis shows that mark sensing makes sense economically, or your present system requires a larger size ticket, consult your Calculagraph distributor today. Ask him about the set back handle feature as well as other modernization features of the NEW Calculagraph.





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HARRY: "I need a tri-directional sign . . . a couple of hundred splicing sleeves . . . and two beige wall telephones."

CHET: "No problem at all, Harry. I'll take care of it."

HARRY: "But Chet—I need this stuff 'yesterday.' I know it's not much of an order, but can you rush it?"

CHET: "I'll get it out this afternoon, special delivery."

HARRY: "Thanks a million, Chet. Sure appreciate it."

CHET: "Well, we appreciate getting your order. Every single one is important to us, regardless of size."

HARRY: "How about that!"

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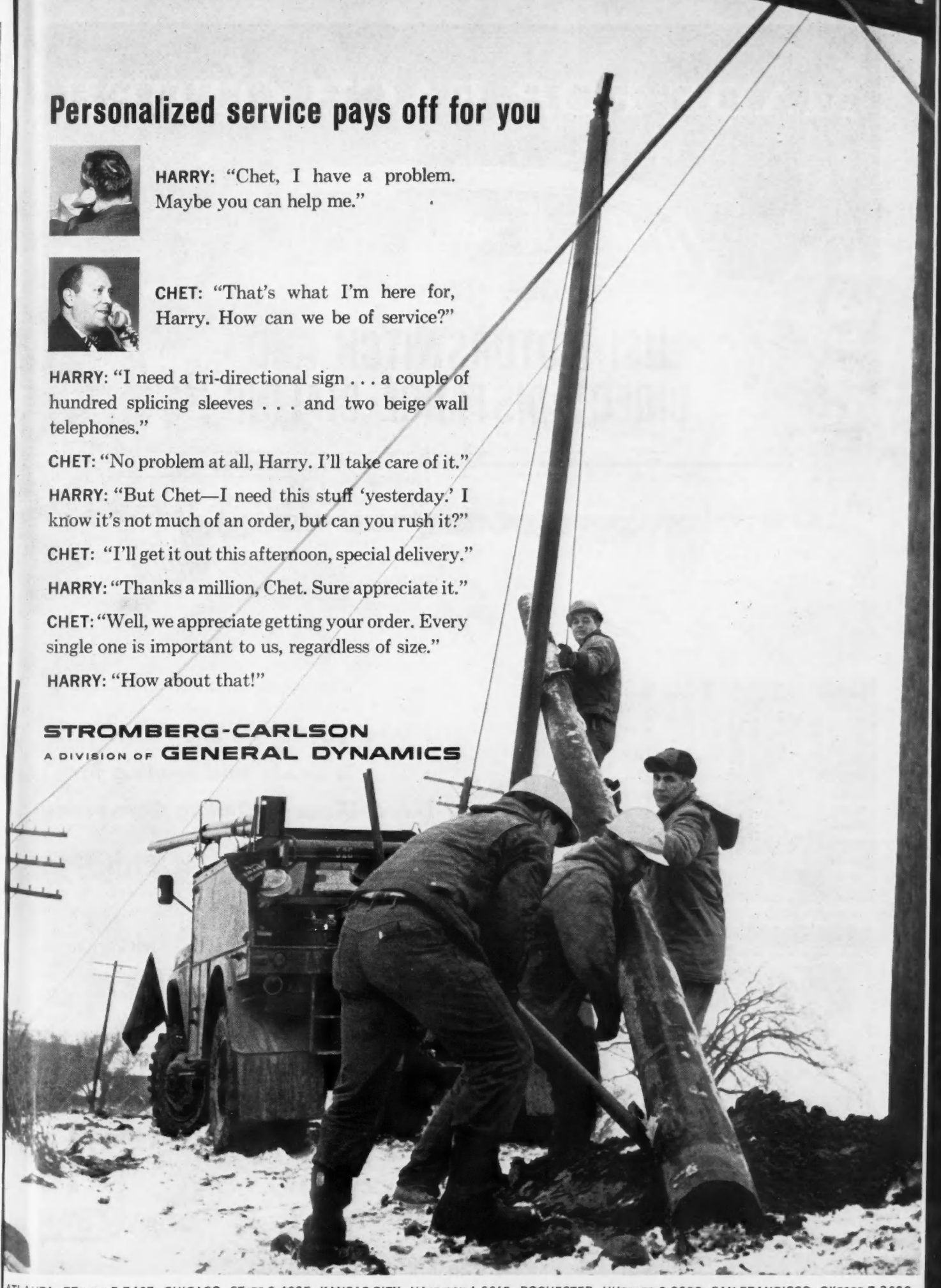

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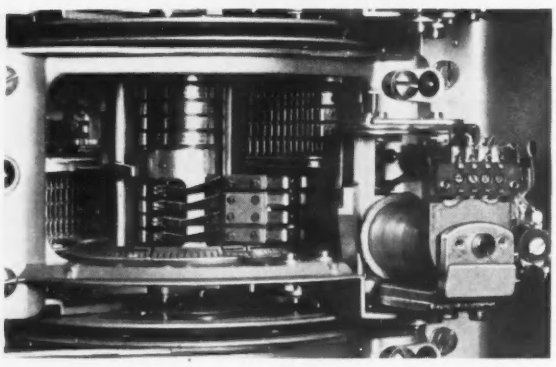

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THE VANISHING EIGHT-PARTY LINE

If telephone companies can maintain a rate of return sufficient to attract the large amounts of capital required, the opportunity to improve suburban telephone service is certainly at hand.

By HARRY H. GARMAN*

SINCE the first World War, many so-called fixtures of rural life in the United States have gone the way of the passenger pigeon. At least one, however, has flourished until quite recently: the eight-party rural line. But in our Indiana exchanges over the next several years, the eight-party line should also become associated with the vanished horse and buggy, the dirt road, the windmill and the washboard.

None of these characteristics of rural life vanished overnight; in fact many of them were quite acceptable for years. And this has been true despite the fact that economic conditions, far-reaching inventions and world conflicts have frequently triggered great spurts in the normal evolutionary development.

The model-T and its clouds of dust foretold the birth of a new transportation era and miles of modern highways. Gasoline-powered farm machinery presaged the end of the horse-powered farm economy. Rural electrification brought modern urban conveniences. Together these advances completely altered rural America. Meanwhile the replacement of grounded iron wire, improved pole line construction and aerial wire maintenance, and better ringing and dial service had gone far to make the multi-party rural line a generally adequate communication service.

However, we in the telephone industry should recall with pride that before the farmer had much use of the automobile, miles of improved highways, efficient farm machinery or any rural electrification to speak of, he had telephone service.

Following World War II the decentralization and rapid expansion of industry, the upsurge in family income and the population explosion resulted in a spectacular shift in the kinds of people living in rural areas.

Mr. Garman is market engineer for the Indiana Bell Telephone Co., Inc., Indianapolis.

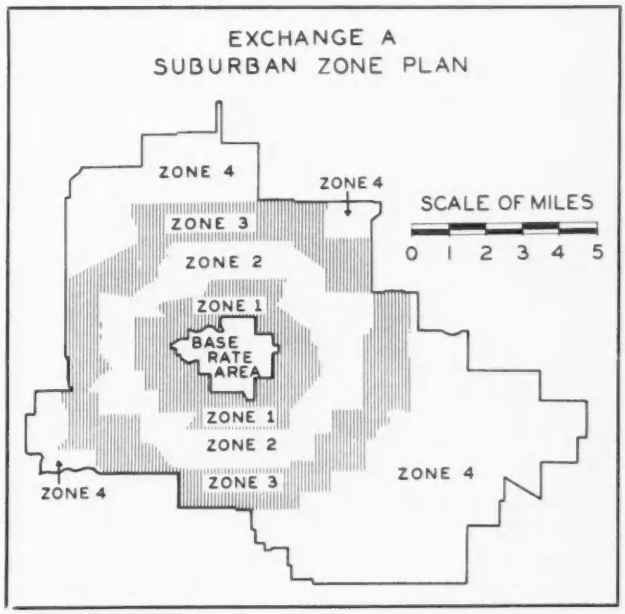

FIG. ONE: — Zoned areas of Exchange A.

The era of suburbia had arrived with its vast need for fast and efficient methods of communication.

Recent estimates indicate that Indiana will experience a population growth in excess of 20 per cent in the next decade. Our state is becoming more and more industrialized. Current employment reports indicate that over 90 per cent of those gainfully employed in Indiana are engaged in non-agricultural occupations. These statistics merely emphasize what is apparent to even the casual observer who surveys rural Indiana.

Arrival of the Suburbanite

HAVING grown up with an eight-party rural line, farmers with such service frequently get along reasonably well with it. But when a newly arrived suburbanite, accustomed to better service, is placed on the line the result is often chaotic. The modern farmer realizes his need for improved telephone service and his neighbor in suburbia demands it. The customer

need, desire and economic ability are present. The necessary telephone equipment is available together with the greatly increased concentration of customers required for an economically sound development.

If telephone companies can maintain a rate of return sufficient to attract the large amounts of capital required, the opportunity is certainly at hand to improve suburban telephone service. A forward looking rate structure and service offering which brings in sufficient additional revenue to offset the additional costs can be developed.

Historically, the needs of our rural area subscribers for urban type service were isolated and thus costly to meet. Hence the mileage measurement method of charging for higher grades of telephone service became common practice. Under this method, charges for 1, 2 or 4-party urban type service in our rural areas are the basic rates applicable in each exchange for that service, plus a mileage charge based on the number of quarter mile units of mileage for each customer, measured from the base rate boundary.

This method has always been difficult to administer and has made the charges for higher grades of service in the more remote areas more than some people are accustomed to or willing to pay. This system of charges has limited development of the more desirable grades of telephone service and has become a stumbling block to the effective introduction of our own advances in the art of communication such as dial extended area service, customer direct distance dialing and automatic message accounting.

The Suburban Service Plan

WHILE there are doubtless a good many possible solutions, we believe that the Indiana Suburban Service Plan, inaugurated over two years ago under the leadership of our president Roy C. Echols, then vice president and general manager, effectively meets the need for our exchanges. In lieu of the mileage charge system we have substituted four zones located around the base rate area of an exchange with flat rate incremental zone charges applying in each zone for 1, 2 and 4-party service(see *Table One*).

TABLE ONE

Suburban Zone Increments Applicable In Lieu of Mileage Units

Class of Service	Zone 1	Zone 2	Zone 3	Zone 4
Residence				
1-Pty.	$1.50	$3.00	$4.50	$6.80
2-Pty.	1.00	2.00	3.00	4.50
4-Pty.	1.00	1.50	1.75	2.00
Business				
1-Pty.	1.50	3.00	4.50	6.80
4-Pty.	1.50	2.00	2.50	3.00

The flat charge in each zone is greater as the distance from the base rate boundary increases, reflecting the higher cost of furnishing service over greater distances.

Our new Suburban Service plan enables the great majority of subscribers in our suburban areas to obtain 1, 2 and 4-party service at monthly charges which are lower than those presently incurred in obtaining the same grades of service under the mileage charge system.

Of our four zones the first three zones are roughly a mile in width. This distance varies, as one of the administrative advantages of this plan is the use of natural boundaries (roads, rivers, railroads and canals) wherever possible. The fourth zone always includes the remainder of the rural area of the exchange. Suburban Zone rates are filed in our Tariffs (see *Table Two*) and

TABLE TWO

Portion Of Tariff For Rate Classification "E" Exchanges

RESIDENCE FLAT RATE	URBAN MONTHLY RATES	SUBURBAN MONTHLY RATES Zone 1	Zone 2	Zone 3	Zone 4
1-Pty.	$ 4.70	$ 6.20	$ 7.70	$ 9.20	$11.50
2-Pty.	4.00	5.00	6.00	7.00	8.50
4-Pty.	—	4.40	4.90	5.15	5.40
BUSINESS FLAT RATE					
1-Pty.	10.15	11.65	13.15	14.65	16.95
2-Pty.	8.50	—	—	—	—
4-Pty.	—	6.20	6.70	7.20	7.70

quoted to our customers as a total monthly rate varying only as to grade of service and location of the customer in the zones. This method is simple and effective to administer.

After determining our service offering and rate treatment we ran a test in Crawfordsville, an exchange which was scheduled for a dial conversion, an extended area service plan and customer direct distance dialing. For the test, three rural leads were selected with 135 subscribers, amounting to a 12 per cent sample of the main telephones in the rural area of this exchange. One lead consisted mainly of farmers in Zone Four. The second lead had a heavy non-farm concentration in Zones One, Two and Three. The third lead contained all four zones and covered a sparsely settled low income area.

The results of our initial canvass were signally successful with 131 of the 135 subscribers favorable or unopposed. A considerable demand for upgrading was also revealed. Needless to say we did not overlook the merchandising opportunity, selling extensions to almost a third of those contacted. Obviously the customers were ready and waiting — an ivory tower idea had become a practical reality.

Our plan was implemented fully in this initial exchange with a 96 per cent customer acceptance. To date customer acceptance has ranged from 94 to 98 per cent in the approximately dozen exchanges where the offering has been made. *Table Three* demonstrates the acceptance by depicting the percent distribution of the grades of service beyond the base rate area before and after the introduction of the plan in representative exchanges. Our first effort is identified as Exchange A.

TABLE THREE

Distribution Of Customers Before And After Suburban Zone Plan

Exchanges	% 1-Party		% 2-Party		% 4-Party		% 8-Party	
	Before	After	Before	After	Before	After	Before	After
A	7	15	3	15	0	70	90	0
B	10	19	3	24	2	57	85	0
C	8	15	9	21	2	64	81	0
D	1	16	0	25	2	59	97	0
E	2	27	0	25	1	48	97	0
F	8	11	2	16	0	73	92	0
G	12	16	3	19	0	65	85	0
H	11	22	6	25	2	53	81	0
I	12	18	7	24	4	58	77	0
J	2	13	1	18	0	69	97	0
K	5	21	0	18	1	61	94	0
L	6	42	3	28	0	30	91	0
AVG.	8	19	4	21	1	60	87	0

While several conclusions may be drawn from the grade of service distribution results in *Table Three*, it is perhaps most noteworthy to observe that while the majority of the former 8-party rural customers took 4-party service, a significant number (40%) elected to take the one and 2-party offering.

The actual zoned areas of Exchange A are portrayed in *Figure One*. This exchange area schematic is typical, although of course in our business offices we use actual maps with the zone boundaries carefully keyed to roads, railroads and rivers. Such a map simplifies the problem of locating a potential customer and quoting him a total rate.

Table Four compares the cost to the customer of our present quarter mile mileage plan to our Suburban Service plan. As previously noted our first three zones are approximately one mile in width but for chart presentation we have assumed that they are exactly one mile in width.

Perhaps a comparison will be facilitated by an example. Let us assume that a customer lives between one and two miles from the base rate area boundary. This places the customer in Zone Two which would be from five to eight quarter mile units of mileage depending on the customer's exact location within the zone.

Under our mileage charge plan if the customer desired a 4-party line the mileage charge would be between \$1.75 (35¢ × 5) and \$2.80 (35¢ × 8) compared to our Suburban Service flat rate zone charge of \$1.50.

The saving to the customer is readily apparent. While the flat rate zone charge rises progressively it does not rise as sharply as the quarter mile charge. This makes even individual line service attractive to many customers located at the most distant points. The introduction of the Suburban Service Plan is, of course, an appropriate opportunity to make any base rate extensions which are warranted.

In the buyers' market of our free economy the consumer is constantly offered multiple choices with an ever-increasing variety of goods. Current forecasts for the Sixties call for an increasing number of families with a growing amount of discretionary income available for such things as home swimming pools, boats, hi-fi sets, second cars *and better* communication systems.

We believe the acceptance of the Suburban Service Plan again demonstrates that the public is eager to purchase a demonstrably better product, be it an additional television set or a better grade of telephone service. We think we should continue to introduce advances tailored to the growing needs and desires of our customers to attract our share of the increasing disposable family income. — *Harry H. Garman.*

TABLE FOUR

Comparison Of Quarter Mile Charge With Suburban Zone Charge

Quarter Miles From Base Rate Boundary	1 Party Res.		2 Party Res.		4 Party Res.	
	Present Mileage	Suburban Zone	Present Mileage	Suburban Zone	Present Mileage	Suburban Zone
1	\$ .75	\$1.50	\$ .50	\$1.00	\$ .35	\$1.00
2	1.50	1.50	1.00	1.00	.70	1.00
3	2.25	1.50	1.50	1.00	1.05	1.00
4	3.00	1.50	2.00	1.00	1.40	1.00
5	3.75	3.00	2.50	2.00	1.75	1.50
6	4.50	3.00	3.00	2.00	2.10	1.50
7	5.25	3.00	3.50	2.00	2.45	1.50
8	6.00	3.00	4.00	2.00	2.80	1.50
9	6.75	4.50	4.50	3.00	3.15	1.75
10	7.50	4.50	5.00	3.00	3.50	1.75
11	8.25	4.50	5.50	3.00	3.85	1.75
12	9.00	4.50	6.00	3.00	4.20	1.75
16	12.00	6.80	8.00	4.50	5.60	2.00
20	15.00	6.80	10.00	4.50	7.00	2.00
24	18.00	6.80	12.00	4.50	8.40	2.00

By JAMES L. MORRISON

General Commercial Superintendent,
West Coast Telephone Co.,
Everett, Wash.

Preparing For The Rate Case

In this issue Mr. Morrison concludes his article on "Preparing For The Rate Case" with suggestions for (1) handling the opposition, and (2) preparing for the hearing.

Write Your Subscribers

IN THE last 30 days before the date of filing you should send a letter to each customer. It will cost but a few dollars and can be prepared by mimeograph on your letterhead. See *Exhibit B* for a sample which was well received by customers of several telephone companies. Perhaps you can use all or part of it to good advantage.

You should offer to make a brief appearance at the next meeting of the various clubs, associations and organizations in your area. Tell them the date of filing, what the increase per station will be, and the reasons for filing. Try to avoid technical language such as "rate base" or "rate of return." Your presentation will be more iteresting if you have a commercial artist prepare several 2′ x 3′ posters. These posters might list:

(1) Service improvements since last increase.
(2) Increase in wages, taxes and materials in last two or three years.
(3) Amount of increase per station.
(4) Service improvements, if any, for the future.
(5) Summary of reasons for increase.

These charts can be inexpensively prepared. They will make it easier for you to speak, and will emphasize your main points. Pass out your fact sheets at each meeting.

Call on the mayor, councilmen, bankers, ministers, politicians and other influential citizens. Encourage their suggestions and carefully consider their views.

As you contact customers do not hesitate to ask them to write to the Commission if they feel your proposal for rate relief is fair. If you honestly believe that the community is with you, it might be a good idea to enlist signatures to your own petition. The petition idea can backfire, however, if signatures are not forthcoming. Do not hesitate to ask customers if they are willing to testify in your favor, if necessary, at a public hearing.

Handling The Opposition

IF YOU encounter opposition, consider before you argue. Remember that people need to let off steam once in awhile. Argument from you might force someone into a position of opposition when all he wanted was to "sound off." Keep a record of opposition arguments. Your answers, if honest, logical and persuasive, might be excellent material for newspaper advertisements.

If it becomes necessary for you to argue your position then follow the advice of William Shakespeare, who, in his immortal "Julius Caesar," tells us how we

can win an argument. His advice is contained in Mark Anthony's famous funeral oration and here, in substance, is what he tells us:

(1) Tell the other party what he wants to hear.

(2) Add good points to the opposition argument — things he didn't think about.

(3) Ask questions which point out the opposition weakness. Use illustrations and word pictures in discussing the opposition case. If the opposition expresses fears, play upon them.

EXHIBIT B — CUSTOMER LETTER

DEAR SUBSCRIBER: —

Before long it will be necessary for your telephone company to ask the Public Utility Commission to approve an increase in telephone rates.

When we file our application we will ask for a public hearing in order that you might have an opportunity to hear evidence supporting our need for additional income. You will also have an opportunity to present your views.

Like everyone else we are called upon to pay higher taxes. Over the past ..... years our total tax bill has increased ..... per cent. Wages and salaries are also up and must be kept at a fair level if we are to retain competent help. The material we buy has increased in price. ..... Years ago a 25' telephone pole cost $..... A new one would cost $.....

We have done everything we can to meet these increases within the limits of our income. Now, there is no alternative but for us to take the steps necessary to protect the quality of your service.

We will ask for an increase sufficient to meet our operating expenses and to provide for a reasonable profit. Rates cannot be increased until after approval has been granted by the Public Utility Commission.

We will probably ask for the following new rates:

Class Of Service	Present Rate	Proposed Rate
B-1		
B-2		
R-1		
R-2		
R-4		
Rural		

We want you to know that we have appreciated your support in the past. We value you as a customer and renew our pledge to do everything we can to bring you the best possible telephone service.

Thank you.

Yours very truly,

(4) Soon the opposition will see his case weaken and you have him in a position of asking you for a solution.

(5) Have the solution.

Perhaps Shakespeare's advice will be helpful to you.

The preceding ideas are not all-inclusive. They do, however, outline the scope of your task. Certainly, it is not an easy undertaking. Your efforts to sell your case should continue until the date of filing. Then, and only then, can you taper off. After you have filed, the die has been cast.

What have you accomplished? Well, for one thing you may have worn through the soles of your shoes. You have met new people and made new friends. You have known the satisfaction of a job well done. These things alone should be ample reward.

Of a more practical nature you have eliminated that full or partial vacuum in which rumor and gossip thrive. You have presented your story in a forthright and aggressive manner. You have demonstrated that you have nothing to hide. You have also "smoked out" the opposition. You know who they are and the content of their arguments. You have given them recognition.

Most important of all, however, the actual filing of your application has become an anti-climax. Everyone has expected it and it has already been discussed. Instead of being a signal to the opposition to rise to battle, the chances are excellent that the filing will pass with very little comment. Everyone has let off steam. Prior to the date of filing, the opposition was hardly in a position to protest to the Commission because there was no application. After you have filed, no one can get very excited about an event they knew was coming. Besides, they have already had their say and now, somehow, the issue doesn't seem very important. Furthermore, they will be reluctant to protest just for fear they might be the only complainant.

After you have filed your application you can catch your breath for a week or two. You must, however, keep on top of service complaints and be alert for signs of opposition. This is no time for complacency because trouble is always possible, and those who are inclined toward opposition will be watching you. Especially will customers be alert for signs that you were only putting on a "show" because you wanted a rate increase.

Preparing For The Hearing

LET US now consider a few things you can do in preparation for the rate hearing.

The average telephone rate case hearing is a curious affair. An outsider sees a courtroom setting confused by an informal atmosphere. The language he hears seems to be English, but the words are often technical and interspersed with mathematical gymnastics. The participants take turns in asking questions until their quota is full. Once in awhile an argument seems to develop, only to be snuffed out at the point where it becomes interesting.

Next page, please

In short, many rate case hearings take on the characteristics of an endurance contest in which the participants silently hope that the public will either avoid the affair or at least keep quiet.

Under certain circumstances it may be desirable to conduct the public hearing strictly according to required procedure. The small company, however, is in an excellent position to carry rate case salesmanship into the hearing room and to present evidence in both an interesting and educational manner.

In your application ask the Commission to schedule a hearing. One would probably be set anyway, but your request keeps you on the offensive and counteracts any rumor that you might have something to hide. When the hearing is set do not hesitate to invite and encourage your customers to attend. Those who go at your invitation will be friendly and the others would be going anyway.

You may be able to assist the Commission in obtaining a comfortable hearing room with plenty of seats. Remember that the spectators are customers who keep your company alive.

You will need two basic files of information for the Commission. The first is the direct evidence you will introduce in support of your application. The contents must provide ample proof and should be prepared and presented in proper form. Unless you have provided extra copies of each exhibit for distribution to spectators, these folks will wonder what the exhibits contain. This material is vital to your case and its presentation affords you a fine opportunity for some customer education.

A well-prepared rate case rings true. You can win friends at the hearing by telling a complete story. You can win respect if your presentation is tactfully aggressive and skillfully executed. You will win appreciation if you design your material so that the audience understands what you are doing.

If the Commission does not object it would be an excellent idea to prepare at least the main points in your case on 3′ x 4′ white cards which can be placed on an easel for everyone to see. A more elaborate approach could utilize 35 mm slides or an opaque projector.

A commercial artist can prepare 3′ x 4′ show cards at little expense. Let the lettering be too large rather than too small. Simple bar charts or escalator graphs will show increasing costs and declining earnings. Illustrations can also be used. Even income statements can be attractively illustrated. You will find some good ideas if you can look through some corporation annual reports to stockholders. Don't hesitate to use color.

You don't have to be a showman to do a job like this. On the contrary, it is more difficult to present your case when you don't take advantage of props. Preparation of visual aids will take a little more work, but then preparation has always been the major ingredient in success. Furthermore, thorough preparation breeds self-confidence and oftentimes convinces would-be opposition that the wisest course is silence.

An important objective is to sell your case to customers in the audience. In so doing your effort will not be wasted on the Commission. Hearing examiners must surely grow weary of the same old presentation case after case. They, too, will be receptive to a persuasive approach. If they get a feeling that your customers are with you, the rate increase is in the bag.

The second file of information you should have ready for the hearing is evidence to refute or offset the opposition. If you followed the suggestions set forth in the previous installment you will have a good idea what to expect in the way of opposition.

You probably used your rate case notebook to record adverse comments and complaints. You also noted who said what and when they said it. You have noted any unusual activity in the form of written complaints either to you or to the Commission. You have reviewed trouble tickets. You have asked employes what they have heard. From all this you are in an excellent position to anticipate opposition leaders and arguments.

A day or two before the hearing sit down with your best friends and review anticipated opposition. Is it too late to head it off? What suggestions do your friends have? As a group, what do you feel is the best way to handle known opponents at the hearing?

Your aim is to avoid all possible surprise. More than one rate case has floundered in a sea of unexpected opposition. Every football coach knows that the best defense is a charging offense.

The nature of the opposition will determine your next step. Many telephone rate cases end up as service complaint hearings. If you have a pretty good idea who will complain about service and what they will say, you can counter with trouble records which show what you have done. The fact that you have this information with you will be most impressive and the effect can be devastating to your opponents' position.

Correspondence from your files may refute an opponent. Testimony from an employe or a third party witness may set the record straight. Be prepared with all this material so that it is available for use.

You must, however, exercise extreme caution before using this information. Never browbeat, ridicule or unduly embarass a customer. This is a sure way to get into serious trouble.

This installment ends our series of articles. Chances are you have concluded that the preparation of a rate case can be quite involved. Most of it looks like work and so it is. If it were just a matter of obtaining higher rates you could follow a lot of short cuts and probably receive Commission approval.

Actually, however, you are going before the court of public opinion. You have an opportunity to do more than win a rate case. With adequate preparation you can educate customers not only for present purposes but as a foundation for year around good will and future rate cases. You can win new friends and no one has too many. Best of all you can have the satisfaction of a big job well done. — *James L. Morrison.*

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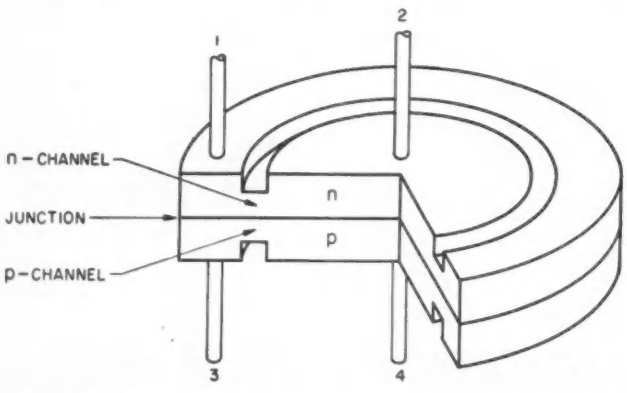
Electronic Communications

New Semiconductor Tetrode

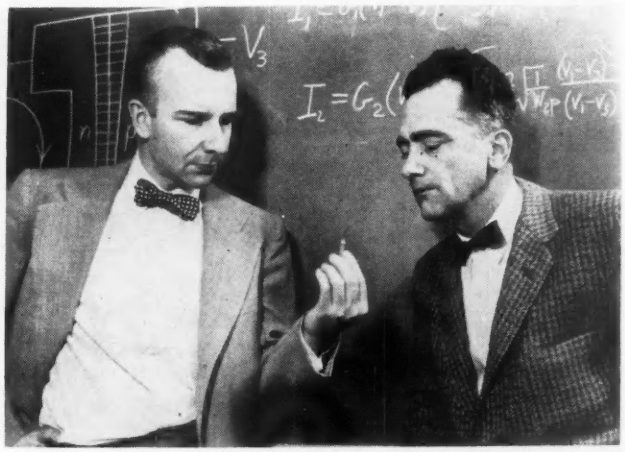
NEW four-terminal semiconductor device, which will perform a number of electronic functions previously either unobtainable or possible only with extensive circuitry, has recently been invented by H. A. Stone and R. M. Warner Jr. of Bell Telephone Laboratories.

The device, the field effect tetrode, can be made to function as a transformer, gyrator, isolator, non-distorting modulator, or a short-circuit stable negative resistance. Laboratory models have been produced which corroborate the theoretical predictions for operation of the device. This theory grew out of work previously reported on a field effect current limiter.

As illustrated in the accompanying sketch, the tetrode is composed of a disk of semiconductor with a diffused junction. A circular trench is cut and etched into each face of the disk, to within about 1 mil of the junction on either side. Two leads are then attached to each face, one inside the trench, the other outside. When a voltage is applied across the junction, the thickness of the depletion layer adjacent to it is increased or decreased, depending on the direction of the biasing voltage. This in turn increases or decreases the resistance of each "channel" between the bottom of the trench and the junction.



Sketch showing construction of new field effect semiconductor tetrode.



R. M. WARNER, JR., (left) and H. A. STONE, JR., of Bell Telephone Laboratories, examine a laboratory model of their newly developed field effect tetrode.

The tetrode will function either as a transformer or a gyrator, depending on the polarity of the biasing voltage. As a transformer, it has a very decided size advantage for low frequency use, although it does not afford d-c isolation. As a gyrator, it acts as a non-reciprocal four terminal network behaving similarly to a transformer, though with a 180° phase shift depending on the direction of transmission, producing impedance inversion. Thus, for example, it should be possible to use the new device to convert the reactance of a miniature capacitor into that of a high-Q inductor.

If the device is biased properly, it will function as an isolator, allowing passage of alternating current in one direction only.

One important application for the new device may be as a distortionless modulator, or electronically controlled resistor for large signals. In this use, a relatively low frequency control-voltage varies the width of the depletion layer, and thus the resistance of the device. Simple capacitors act as high-pass filters to isolate the

control-voltage from the signal, if the frequency ratio is maintained at a high level. The signal voltage does not appear across the junction and has no effect on the depletion layer. Therefore, it may be magnitudes higher than the control voltage, without being distorted by self-modulation. For the same reason, it is not limited by junction capacitance.

If a direct connection is made between the inner lead on one face and the outer lead on the other, the device will function as a two terminal a-c short-circuit stable negative resistance. In experimental models, this performance has been obtained over a range of about 30 to 250 v, at 0.6 to 0.1 ma, in a boron-doped silicon crystal with a phosphorous diffused junction.

Sonotone Battery Cells Operate Transmitter On Pioneer Planet

SONOTONE Corp. sealed battery cells of the sintered-plate, nickel-cadmium type are a vital component in the Pioneer V, the American-made artificial planet now in orbit around the sun, it was recently announced by Sonotone President Irving I. Schachtel.

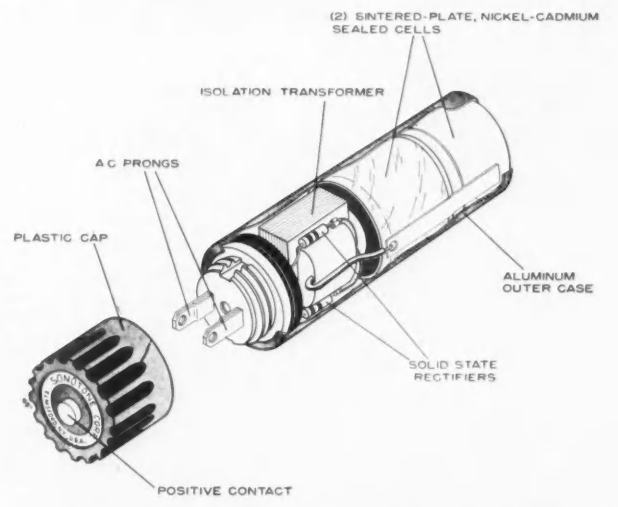
A storage bank of 28 Sonotone battery cells ("F" size) is used in the 26-inch payload sphere of the Pioneer to operate the vehicle's radio transmitters. The latter include one of 150 watts which is the most powerful ever sent into deep space and capable of sending scientific information up to 50,000,000 miles, a greater distance than that of any vehicle yet tracked.

Before each 5-minute broadcast from this transmitter, the nickel-cadmium battery cells are to be recharged for about 5 hours with electrical energy generated from the sun's rays by some 4,800 solar converters contained on four "paddlewheels" mounted on the sphere's exterior. There are no other batteries in the sphere.

It is planned to maintain regular radio contact with the Pioneer V for at least five months, when the sphere will race out of range. It is hoped to renew the signals in 1966, when the planetoid swings back within 50 million miles of the earth.

The Pioneer was launched from Cape Canaveral, Florida, at 8 A.M. March 11. Some 35 hours later, when the interplanetary probe vehicle was approximately 245,000 miles from earth, its batteries, in conjunction with the solar converters, were reported to be recharging "even better than expected" by officials of the National Aeronautics and Space Administration in Washington.

Sonotone's patented sealed battery cells were installed in the Pioneer by Space Technology Laboratories, Inc., of Los Angeles, Cal., prime contractors on the vehicle for the NASA under direction of the U. S. Air Force Ballistic Missile Division. Similar battery cells from Sonotone were also installed in the successful Explorer VI satellite, the first of the "paddlewheel" vehicles.



This is a cutaway drawing of the Sonotone Rechargeable Flashlight Battery Cartridge, which can be used in any flashlight (or any other device) powered by two "D"-size cells end to end. It can be recharged by plugging into any 115-volt AC outlet.

Cleaning With Sound

WESTERN ELECTRIC has now turned to sound as a means for cleaning the chutes of coin-collector telephones under repair in distributing houses.

According to *"The WE Observer"* some 250,000 of these instruments are repaired annually. The chutes, part of the delicate coin collecting mechanism on pay station telephones, have always been difficult to clean by ordinary methods. Often contaminated with dirt and other foreign substances, they had to be removed from the telephones and either carefully hand-cleaned or — minus electromagnet and other attachments — immersed in a mechanically agitated cleaning solution. Now, an ultrasonic cleaning machine has solved this problem.

About the size of a floor-model TV, the new machine uses high-energy sound waves with a frequency beyond the range of human hearing to accomplish the cleaning of chutes. The sound waves are transmitted through a liquid solvent contained in the machine's four-gallon cleaning tank. This causes "cold boiling" in the solution, with millions of microscopic bubbles forming and collapsing at the rate of 40,000 times per second. The bubbles' violent action can scrub away dirt, oil, grease and other foreign matter from any item immersed in the liquid without harming the item itself.

The sound waves are produced by applying a high-frequency current to nine barium-titanate ceramic transducers secured to the underside of the cleaning tank.

Thanks to the many readers who have written us regarding TE&M's new feature — "Electronic Communications." We appreciate your kind comments. And for those readers who have asked for a Home Study Course in "Electronics," we will start the course in an early issue.

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For details and selling aids, contact your Stromberg-Carlson representative.

In Atlanta call TRinity 5-7467; in Chicago STate 2-4235; in Kansas City HArrison 1-6618; in Rochester HUbbard 2-2200; in San Francisco OXford 7-3630.

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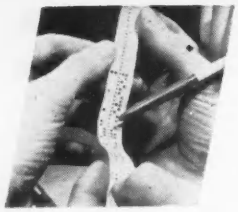


"TRAFFIC LIGHTS" by D. A. PERIGO

Automation and Full Employment

What happens when automation comes along? One telephone company, with 599 operators on its payroll, converted 15 manual offices to dial, established extended area service for 11 exchanges and direct distance dialing in 14 exchanges. Net reduction: 3 operators for 40 mechanization jobs.

AT THE end of 1953 a certain telephone company had 599 operators on its payroll. During the next six years this company converted 15 local manual offices to dial operation; Extended Area Service was established for 11 exchanges; and Direct Distance Dialing was established in 14 exchanges. Here are 40 mechanization jobs to reduce the requirements for people, and yet at the end of 1959 there were 596 operators — a net reduction of three.

During the same period the total number of people employed by this company *increased* by almost 200. Strangely enough this company has been having some problems in obtaining *qualified* applicants for operator positions. What would the problem have been without the 40 mechanization jobs?

Currently a Senate Committee of six Democrats and three Republicans is working on proposed legislation to provide jobs for the 13,500,000 people who will be added to the employables in the next decade.

At this point there may be a question as to why a Traffic man gets on this subject — and the answer is, this problem is everybody's business, so we want to get our views stated.

"The Wrong Problem"

OUR FIRST observation is that the nine Senators are working on the wrong problem. Why break a man's legs so he must use crutches when it is perfectly obvious that he wants to walk without impairment? "Aid to distressed areas, Federal aid to states to cover public assistance, a youth conservation corps, etc." It seems to us that if the Senators would spend their time working on plans to increase government efficiency and cut out some of the ridiculous subsidies and fancy programs — and help the states and cities to do the same thing — *industry would have the jobs for the* 13,500,000 — plus all of the thousands who would be released from government payrolls.

Likewise, the Senators could use their influence with labor (or is the influence only in the other direction?) to use some measure of good sense in their demands. Certainly responsible labor leaders should recognize some signs that may spell their doom unless corrective action is taken. For example: When foreign companies can buy our raw materials, transport them to their country, process them, transport the finished product back to this country, pay a duty on it — and then sell it for less than an American company can, it seems to us labor should be very much concerned because it is labor that needs the jobs — the owners can still buy groceries. We suggest that they review the fable of the goose that laid the golden egg.

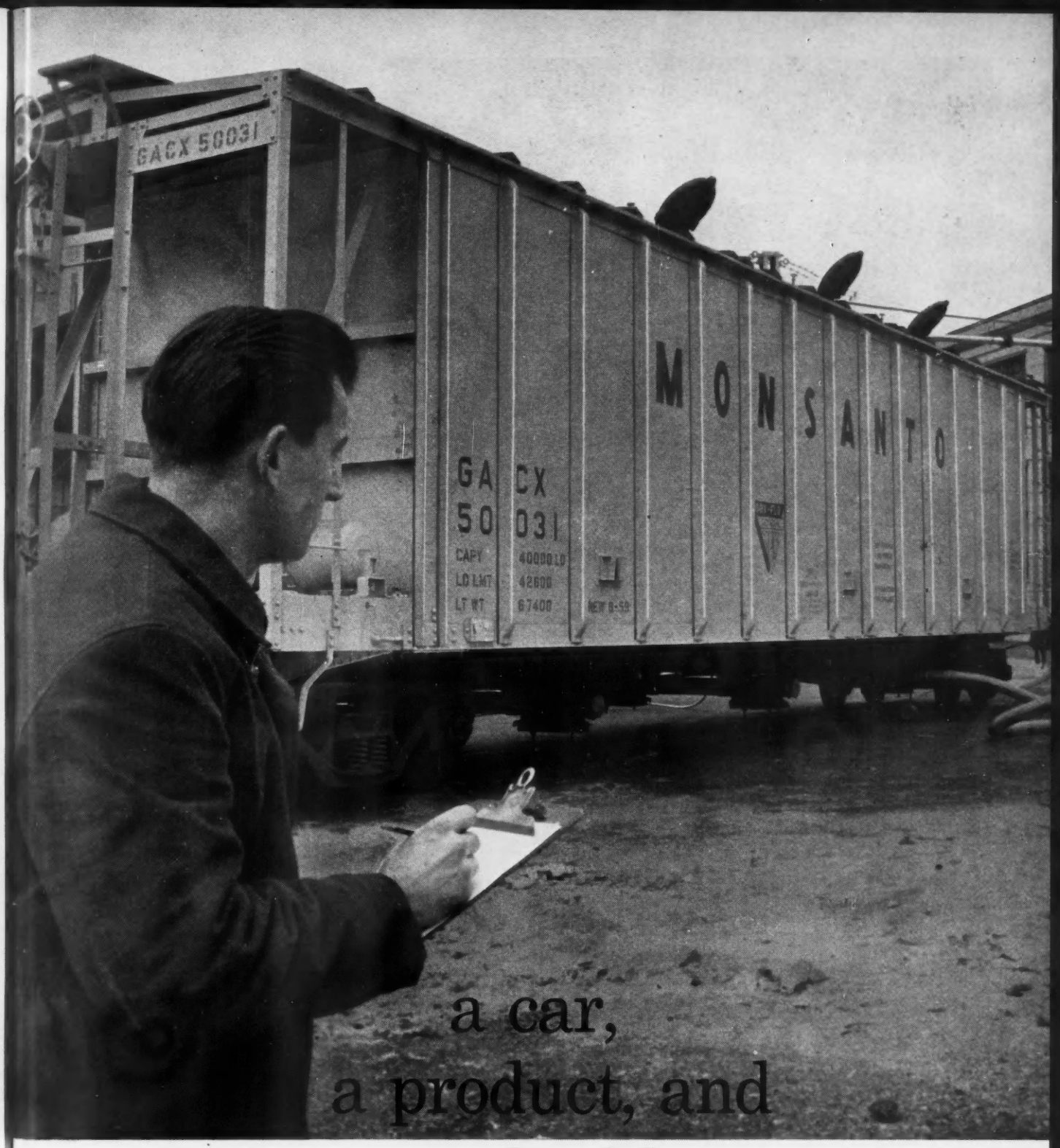
Another example of what could spell doom for the unions is for labor leaders to threaten to bring a company to its knees — because if, and when, it does, that union commits suicide. Without the money to buy food, labor has no money to pay dues.

We always seem to have a few million jobless people. This is always blamed on the political party in power at the time — but the party in power always counters with the fact that more people are employed, and at higher wages, than ever before in our history. Both can be right — but, Oh well, that's politics!

But what about these jobless people? What do we know about them? What would a personal interview with each one reveal? With so many unemployed why is it that the daily newspapers are full of want ads for *qualified* people?

There are some legitimate unemployed — for whom we feel nothing but sorrow. But we believe that most of the unemployed are actually unemployable. We don't mean they are alcoholics, dope addicts, or handicapped — although thousands of them fall into these classifications. There are those who are thoroughly capable of digging ditches, pitching hay, or mixing cement, but in today's world these jobs are done by machines — and these people don't qualify for other jobs. Some of the unemployed refuse to learn a new trade — or they refuse to move to a place where there is work. We should also be aware that some people classified as unemployed really have a full time job avoiding work.

Since people are people we believe that in the 13,500,000 the Senators are worrying about they will find



a car, a product, and a valuable new service...

This car carried the first Monsanto bulk-hopper shipment of weather resistant polyethylene compound to Western Electric's Kearny Plant. The polyethylene was Monsanto's 14202, now approved by Western Electric for high molecular weight black polyethylene telephone cable jacket applications. And this bulk handling service for polyethylene is one of a long list of Monsanto developments with immediate value to wire and cable manufacturers in cutting material costs, increasing plant efficiency, and improving products. If you are considering bulk handling for your plant, send for a new Monsanto report based on a comprehensive 5-year study of the subject. Monsanto Chemical Company, Plastics Division, Room 736, Springfield 2, Massachusetts.

Monsanto

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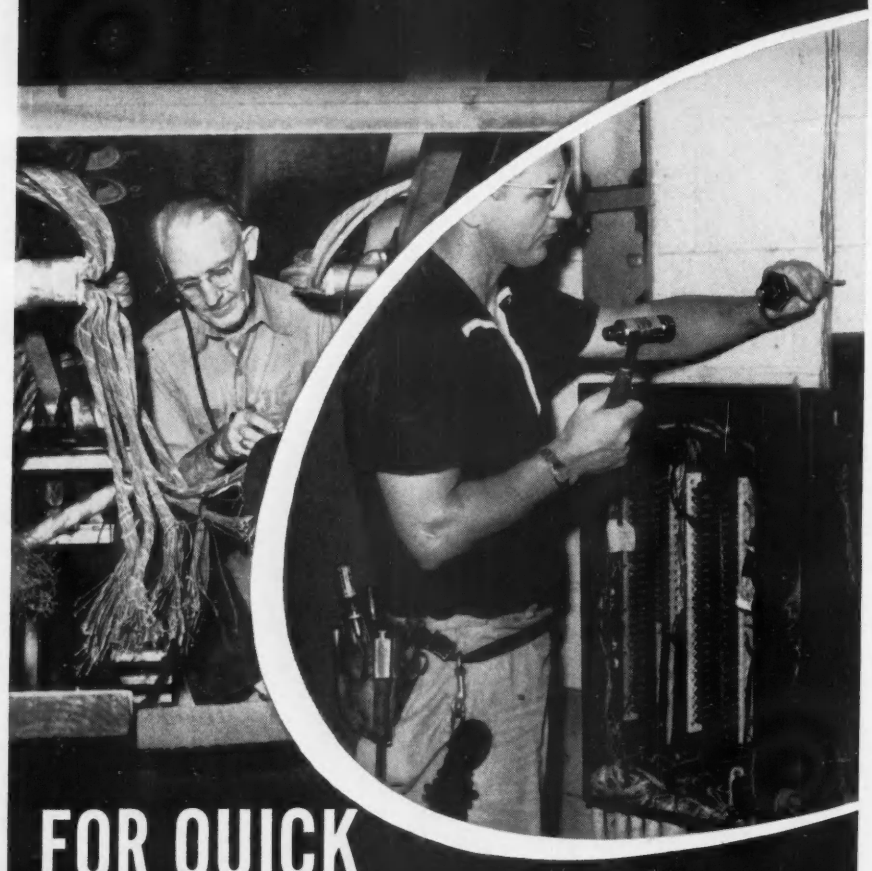
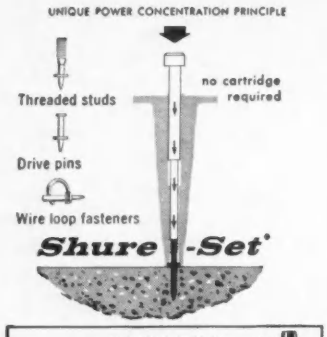
Experienced installers use SHURE-SET



FOR QUICK EASY FASTENING AND DRILLING INTO CONCRETE



Looking for a way to speed fastening time and reduce mess on every job? Shure-Set is the best answer . . . a lightweight, versatile, easy-to-use tool with proved ability to set rugged fasteners into concrete, block or masonry quicker and easier than old-fashioned methods. No pre-drilling, no cartridge—a few hammer blows and the job is done! Approved Shure-Set tools and fasteners are precision-made of the finest materials, assuring maximum dependability and trouble-free service.

Here's another advantage—the Shure-Set tool doubles as a masonry drill holder, for use where "tap-and-turn" drilling may still be required. Versatility . . . dependability . . . worker acceptance . . . efficiency . . . wide selection of austempered fasteners . . . all good reasons for you to call your Shure-Set or Ramset dealer (under "Tools" in Yellow Pages), or write us direct for cost-cutting details.

NEW SHURE-DRIVE® HAMMER with Floating-Action

Newly-patented hammer actually absorbs shock, increases power and reduces worker fatigue. Ask for model R-400.

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Ramset® Fastening System

OLIN MATHIESON

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about the same percentage who will be unemployed as the percentage now stands and for the reasons given in the preceding paragraph.

We are curious as to why the Senators feel that industry will not have jobs for these people. Is it because they *know* that government will not stop its unnecessary spending and the unions will not come to their senses?

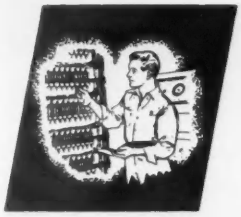
Industry knows that unemployed people do not buy their products. Who then is most interested in providing jobs for everyone qualified to handle one? Most companies are so proud of the people they employ that they publish it regularly.

Why, then, do we have automation (mechanization)? A business can exist only if it shows a profit. When a business ceases to exist all jobs associated with it go off the market. Yes, people become unemployed. For example, let's say a business employs 100 people. Profits are becoming less and less. Analyses indicate that taxes and wages are the causes. The price of the product is increased — and people slow up in buying it. Unless some jobs are mechanized the company must fold. They do mechanize, and as a result 25 people are laid off — *but remember that 75 people still have jobs which they would not have had except for mechanization.*

There is another reason. Take the case of the telephone company we mentioned earlier. If there is a problem in obtaining qualified operators after doing 40 mechanization jobs, where in the world would that company find enough people if it had not mechanized?

We think the nine Senators should also consider the fact that the 13,500,000 people whom they estimate will be in the labor market *are also* 13,500,000 *purchasers of goods* — and their demands will create jobs. So far we have seen no report on how much money will be required to support the programs which the Senators propose, but whatever it is it must come from taxes — and that item all by itself will not create jobs.

And so we enter a plea to the Congress and all Labor Leaders — Please don't force us into disaster. — *D. A. Perigo.*



"SUB-HARMONICS and OVERTONES"

By C. D. EHINGER

A Fundamental Approach to VNL

Are you "in the know" when VNL is discussed and planned? In this series of articles, Mr. Ehinger defines terms, explains fundamentals, and shows how to calculate this transmission design objective. VNL familiarity is a "must" for all telephone personnel. (This article will be presented in four installments.)

I MUST admit that, until recently, I have not paid too much attention to the transmission requirements of the over-all Distance Dialing switching plan. From the various letters and other correspondence which I have received, I learn that I have not been alone in this lack of attention to one more detail, among the many, which adds to the increasing burden which we must assume. However, I believe that I am quite safe in saying that all of us, in the telephone industry, must become increasingly aware of the over-all design objectives which must be met if Distance Dialing is to perform satisfactorily, from a transmission standpoint, on every occasion rather than spasmodically.

Whether we like it or not and whether it is applicable or not to our particular segment of the industry, all of us are often hearing the terms VNL, TNL, End Offices, VNL+2, Bias, etc. Too many of us are being placed in the position of smiling knowingly, when we hear these terms, and actually not having even a vague idea of the actual meanings and definitions of the terms.

It is with these thoughts in mind that this series of articles is being written. It might be advisable, at this point, to also mention that quite complete coverage on this subject is contained in Section VI of the "Notes on Distance Dialing" as revised September, 1956, issued by the Department of Operation and Engineering of the American Telephone and Telegraph Company. For those of you who may wish to dig into the subject much more completely and thoroughly, I heartily recommend that you obtain a copy of this very valuable book. It is clear, concise, and fully covers the subject in much more detail than space will allow in these articles.

Human Factor Lost In Distance Dialing

IT APPEARS that a good starting point is a consideration of the somewhat unique problems which are encountered in Distance Dialing. In the days when manual switching was used for tandem operation, an entirely different set of circumstances was involved in the course of completion of toll traffic. First, routings were such that all traffic was handled with the minimum amount of switching in the build-up of the circuits. Secondly, an operator was involved and, being human, she invariably knew which were the "best circuits" in any group and could use a certain amount of discretion and selection as an aid in the build-up of the circuit.

In the case of Distance Dialing, these factors are entirely changed and we may now have cases where a total of seven (eight in foreign calls) circuits are used in tandem in addition to the two toll connecting trunks in the end offices. Successive calls, between identical points, may *never* use the same make-up of circuits each time.

It boils down to the fact that Joe Doe, in New York City, has occasion to call Jack Blow in San Francisco many times a week. Joe reasons that, since he pays the same rate for each call, he has the right to expect the same quality of transmission on each toll call irrespective of the fact that our machines may have arbitrarily decided to give him different routes and a different number of switches in selecting the circuit make-up from New York City to San Francisco. Looking at the problem from Joe Doe's standpoint, we cannot help but agree with him, but, at the same time, realize that delivering the goods requires a bit of doing.

Uniformity Is A Necessity

SINCE the entire problem boils down to the requirement of not only providing *high quality* transmission but *uniformity of high quality* on each toll call, several new items become clear. We must not only engineer and construct our toll circuits for minimum losses but, perhaps even more important, must insure that all circuits within a toll group are equally good. It is quite easy to see that if every toll circuit group in the country had a difference, or gradient, of 2 dbm in transmission qualities, unacceptable situations could result.

On successive calls involving the maximum number of toll circuits in tandem, namely ten, differences in transmission level of 20 dbm could be possible. Such a situation would not be tolerated by our toll subscribers and most certainly would not be

conducive to building up increased toll usage.

There is, of course, an obvious solution to the entire problem. If every toll circuit in the United States is engineered and built to have no loss (0 dbm), then every subscriber conversation can be delivered at the terminating point at no loss regardless of the number of circuits involved, differences in routings on successive calls, etc. Unfortunately, this is "an end devoutly to be desired" but quite impractical at the present state of development in toll transmission.

There are three major factors which constantly bedevil the transmission engineer in his attempts and constant struggle to reach the distant goal — stable circuits at zero loss. These three factors are: (1) Echo; (2) singing; and (3) noise and crosstalk.

Worms In the Woodwork

IT IS QUITE important, in understanding the definition of VNL, to have a firm foundation of basic knowledge concerning each of these three "worms in the woodwork." Echo can exist on any type of circuit whether it be a 2-wire or a 4-wire circuit. For the purposes of illustration and clarity, it is easier to demonstrate echo by means of a simple 4-wire circuit.

EDITOR'S NOTE

ALLAN STACEY'S popular TE&M department — "Commercial Department Notes" — is missing from this issue. And for a good reason: Allan has had a rough time with a bad case of influenza measles. At last report, the spots have gone away and Allan's department will be in its regular space in the next issue of TE&M.

Figure One is a representation of such a circuit terminating at points A and B in hybrid coils at each location as indicated. Some form of amplification is also used for the purpose of overcoming transmission losses. Points A and B, the terminations, may be anything from a simple telephone set, to a long length of exchange cable terminated in a telephone set, a carrier derived circuit plus terminations, loaded cable terminated in a telephone set, etc.

Since such a wide variety of terminations are possible, the impedance at point A (Z_A) and at point B (Z_B) will vary widely and will fluctuate over the frequency band used. Because of this condition, it can be easily seen that the balancing network cannot present a perfect balancing impedance under every possible condition.

In the next issue we will follow the course of energy in this hypothetical circuit in the form of voice communication (C) introduced at point A and see what happens to the distribution of this energy. In the meantime, here is a typical VNL design problem. The answer will be listed in the next issue of TE&M.

A circuit exists between a toll center and an end office.

Make-up of the circuit is as follows:

6.85 miles of 19 ga. H-88-50 loaded cable

12 miles of open wire (.104 copper)

28 miles of carrier on open wire

For what total circuit loss between the two offices should the circuit be engineered? *(Continued in next issue.)*

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Any comments, criticisms, or suggested subjects for future topics? Address all correspondence to "Sub-Harmonics and Overtones," Telephone Engineer & Management, 7720 Sheridan Road, Chicago 26, Illinois.

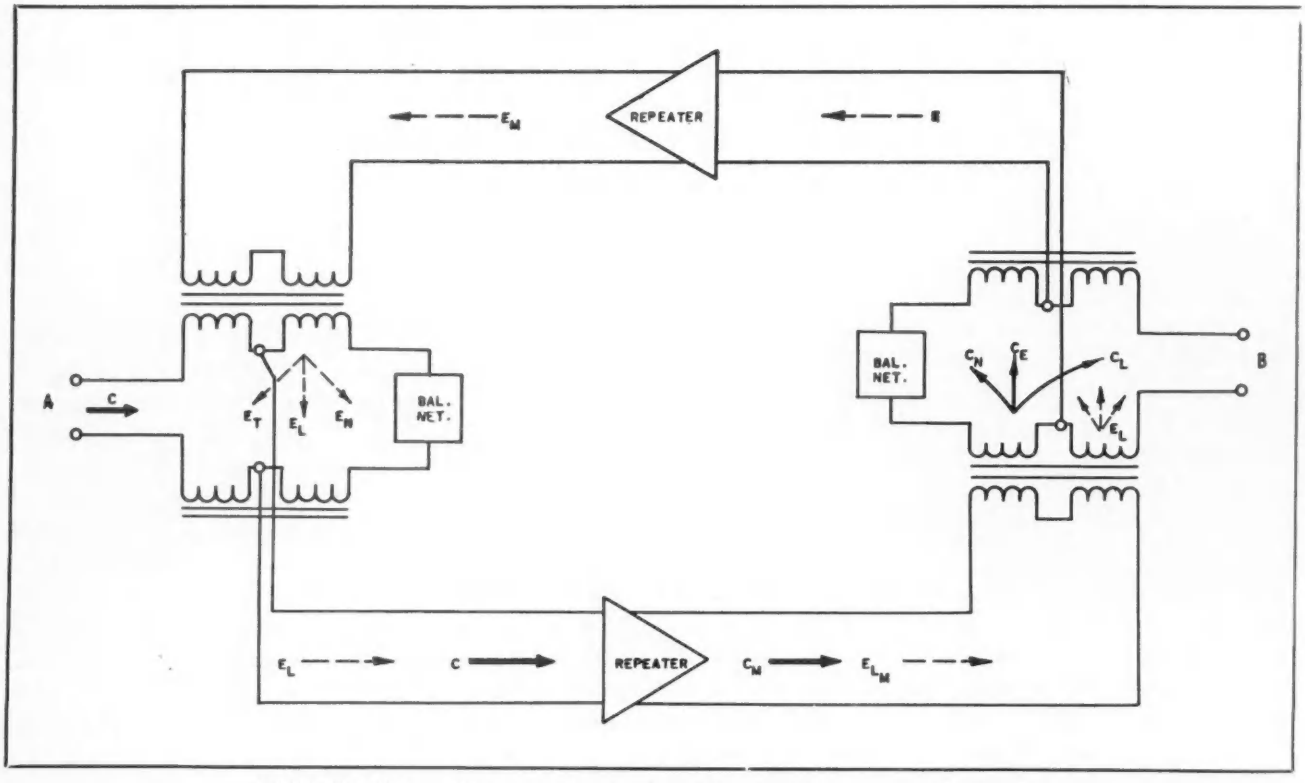
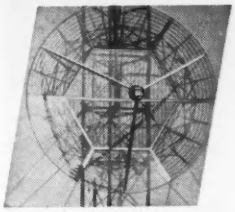


FIGURE ONE: — Energy paths (and undesired paths) in typical toll call.



PLANT ENGINEERING NOTES
By JOHN S. REED

New Crawler-Riding Cable Layer

New cable layer lays cable as it makes the cut, eliminating the need for separate trenching and laying operations . . . CEECO announces build-out capacitor units for cables . . . Arborist Association tells how to determine value of a shade tree.

New Cable Layer Rides on Crawlers

WITHIN THE past several years, there has been a rapid rise in the number of wire and cable burying projects. A number of cable and wire laying machines have been developed to enable the burying of these facilities for providing telephone service.

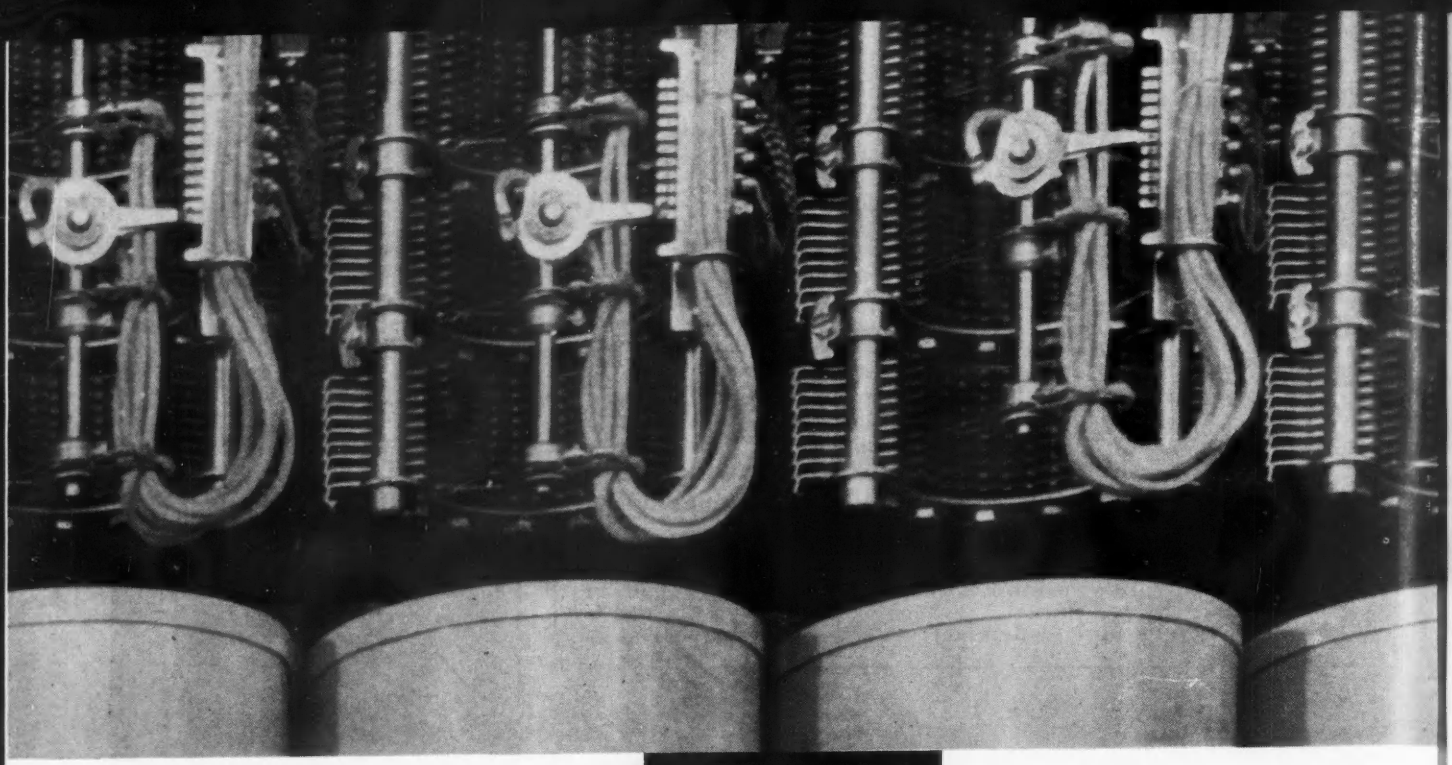
The John Deere cable layer (see illustration) is designed specifically for such laying operations. It is claimed to reduce the cost of laying wire or cable underground for telephone and other services, making installations easy, economical, and practical in urban as well as rural areas.

With either a crawler or wheel tractor, this unit lays multiple pairs of wire or single cable as large as 1 3/16 inches in diameter at any depth from 6 to 30 inches. It lays the cable as it makes the cut, eliminating the need for separate trenching and laying operations. When the cable has been laid, the narrow opening over it can be closed easily by driving a tractor or truck over the cut.

Rear view of John Deere cable layer showing plow blade and coulter wheel for cutting turf for blade.

The cable guide bar can be adjusted from a low position for cables up to 3/4-inch in diameter to high position for cables 7/8 to 1 3/16 inch

John Deere Model 230 cable layer in operation.



Quality construction is an important factor to the man who selects dial switching equipment. That's why so many telephone men have toured our factory at Northlake, Illinois, to see the entire manufacturing process of Strowger equipment. They've seen how raw materials are carefully inspected for quality. They've observed the close tolerances to which each Strowger part is manufactured to insure ease of adjustment. They've watched the accurate control that is applied in the finishing of Strowger parts to provide good fit and lifetime protection. And, they've noted the constant inspection of these parts during every stage of production. No wonder so many telephone men choose Strowger!

QUALITY CONSTRUCTION...

another reason why telephone men choose Strowger!

FIND OUT FOR YOURSELF! The next time you're in the Chicago area, come and visit us. We'll be glad to show you through our entire Northlake plant. You'll see the unsurpassed quality and craftsmanship in the construction of Strowger. To make arrangements for your tour, write Automatic Electric Sales Corporation, Northlake, Illinois.

AUTOMATIC ELECTRIC GENERAL SYSTEM

Subsidiary of

GENERAL TELEPHONE & ELECTRONICS

in diameter. Removing the guide bar from the cable channel at the rear of the standard opens the entire channel so that wire or cable can be inserted or removed without cutting or threading. A simple pin secures the guide bar in either of two positions to suit the size and bending radius of the cable being laid.

The shin, or forward edge of the standard, easily breaks through hard surfaces for installations along roads and through asphalt driveways or tarred roads. The 2¼-inch diameter round point at the base of the standard minimizes the lifting or heaving of the ground.

A heavy pivot arrangement built into the cable layer supplements the tractor's 3-point hitch when turning. Leaf-type centering springs, which hold the main frame steady for transport, allow the frame to pivot when making turns. The minimum turning radius with the standard in the ground is 14 feet.

If the unit strikes a large rock, culvert, or other hidden obstruction, a shear bolt at the lower fastening location of the standard prevents damage to the unit and the cable. When the bolt shears, the shin disengages and the standard pivots rearward. The cable is not damaged as it moves with the standard. The foot of the standard is designed so that cable will not kink when the standard pivots rearward. Restoring the unit to operation requires only a few minutes.

Because of their compactness and easy maneuverability, John Deere crawler-dozer units, equipped with the cable layer, are said to be particularly well suited for work around new homes, between buildings and in other confined spaces. Dependable, durable, and economical to operate, these easy-to-transport units are claimed to cut costs of adding circuits to telephone plants already in use and keep the cost of installing new plants at a minimum.

The cable layer is easily raised to transport position by the tractor's 3-point-hitch control. Extra ground clearance for transporting or loading onto a trailer is obtained by extending the lower draft links.

Crawler-dozer units may be equipped with a reel holder that attaches to the dozer blade. The holder is designed to accommodate large or small reels. Line passes from the reels to the cable layer through open ring-type guides mounted on the crawler permitting operator inspection.

A spring-loaded coulter may be installed for use in sod or trashy conditions, and is recommended when working over established lawns. The coulter is adjustable and may be raised completely out of the way when not needed.

Build-Out Capacitor Units for Cables

TRANSMISSION loss in non-loaded cable is mainly due to the resistance and capacitance characteristics of the cable. This loss can be reduced by using larger gauge wires and/or lower capacitance cables usually at high cost because of the large amount of copper required.

Rather than attempt to use cable with large gauge conductors, the economical way would be to improve the electrical characteristics of the cable. The capacitive effect of cable can be practically eliminated by adding the proper amount of inductance to balance the capacitance. Capacitance balance is obtained by placing lumped inductances at regular intervals in a process called cable loading. Standard loading today makes use of 88 millihenry coils spaced every 6000 feet, termed H88 type loading.

As is often the situation, the 6000-foot spacing between coils cannot be exactly obtained because of obstructions or for other reasons. The effect of spacing irregularities up to about 500 feet is for all practical purpose unnoticeable. Irregularities up to about 200 feet are nearly impossible to measure. However, larger irregularities, over 500 feet, do have a definite detrimental effect on transmission, especially when repeaters are required on the loaded circuits. Consequently, added capacitance in the form of build-out units is needed to effectively eliminate such spacing irregularities. For example, assume the situation where a circuit is loaded as shown in the accompanying illustration. (A 3000 foot section next to the office provides normal spacing for loaded circuits from the office.)

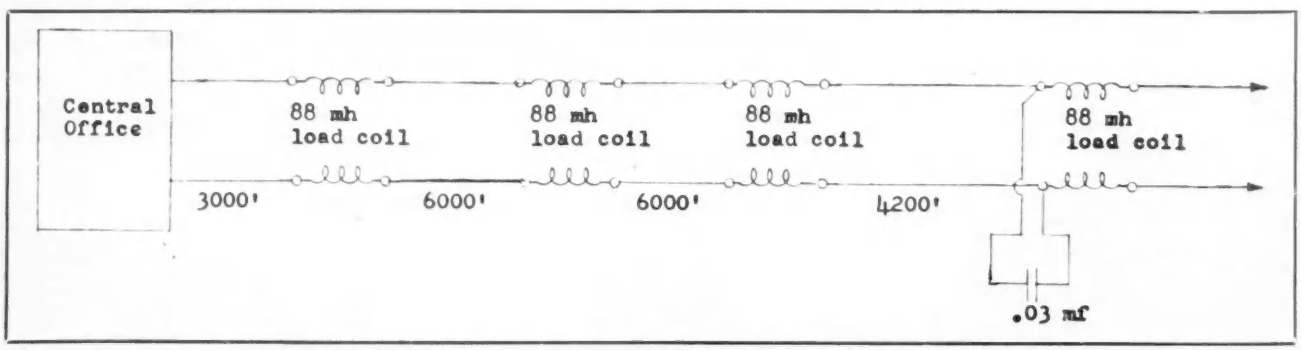
The installation consists of 22-gauge cable with a capacitance of .084 microfarads per mile or .016 mf per 1000 feet. The spacing irregularity at the 4th loading point can be corrected by installing a build-out unit with a .03 mf capacitor. The calculation is as follows:

6000 —4200 = 1800 feet, difference to be compensated for.

$$\frac{1800}{1000} \times .016 = 1.8 \times .016 =$$

0.0288 mf, practically .03 mf.

The build-out capacitors can be in-



Typical example of use of a CEECO build-out capacitor unit (.03 mf) to compensate for a spacing irregularity of 1800 feet. (Communication Equipment & Engineering Co.)

stalled in splicing sleeves where only a few pairs are involved. Build-out units in cases should be used when a large number of pairs are involved. These capacitors are ±3% of specified value with a working voltage maximum of 1000 volts D. C. Capacitors for special requirements are available from the manufacturer.

Determining Value Of A Shade Tree

THE telephone company may on occasion have to settle a damage claim resulting from the destruction of a shade tree as the result of chemical spraying operations along a right-of-way. Usually the company has no specific formula for determining the value of the tree and may have to negotiate the settlement.

The National Arborist Association and the National Shade Tree Conference have established the basic value of a shade tree at $6. per square inch of cross section of the tree trunk. The circumference in inches of the trunk is measured at a distance of 54 inches above the ground line. The area is calculated by squaring the circumference and multiplying by 0.07958.

For a tree measuring 30 inches in circumference the value would be $30^2 \times 0.07958 \times 6$ or $429.73.

The six-dollar per square inch valuation is the maximum for a tree in excellent physical condition and highly valued for its shade and ornamental qualities. Deductions should be made for a tree in poorer condition and less desirable from an ornamental standpoint.

If the tree is undesirable because of its species or location, it may be worth only half of the basic value. A diseased condition or poor symmetry may result in a 25 percent reduction in the valuation.

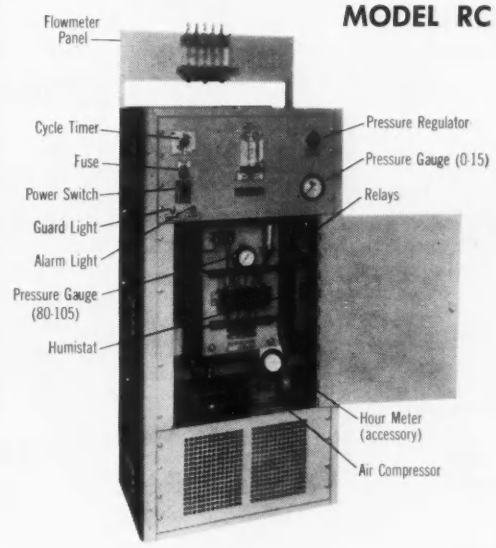
You are invited . . . to tell TE&M authors your problems of department policy or procedure on which you'd like to have an opinion.

While we don't claim to have all the answers, we'll welcome the opportunity to discuss as many as possible in our columns . . . and that could be helpful to you and others with the same (or equal) problem.

be prepared

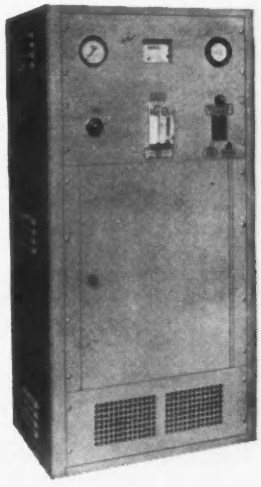
S&G

MODEL RC



Developers of the Dry Air Dehydrator Used Extensively by Many Operating Telephone Companies to Protect Telephone Cables from Moisture

MODEL A



Advantages of using Dry Air Dehydrators (Desiccant Type):

- Dries insulation faster and more efficiently than other types
- Eliminates cable moisture
- Saves maintenance hours
- Saves maintenance dollars
- Converts dollar savings into earnings
- Better service to your customers
- Cable plants prepared for dry air dehydrators definitely reduce maintenance cost
- The cost of installing dry air dehydrators is minor compared with the many advantages to be gained
- Dry air dehydrators are available to suit your cable plants
- There is no easier way to improve your operations and earnings than by the S & G dehydrator

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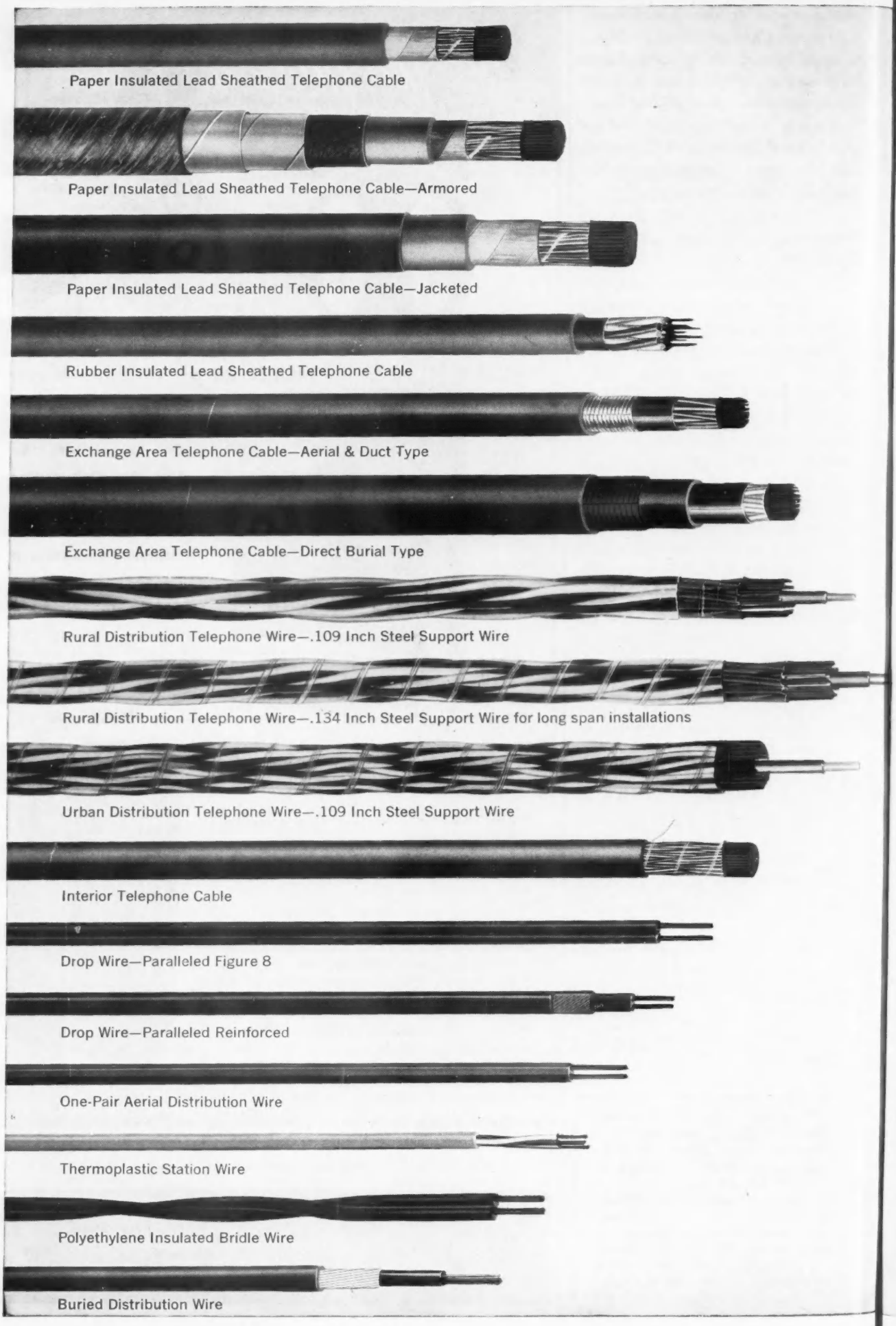

Paper Insulated Lead Sheathed Telephone Cable

Paper Insulated Lead Sheathed Telephone Cable—Armored

Paper Insulated Lead Sheathed Telephone Cable—Jacketed

Rubber Insulated Lead Sheathed Telephone Cable

Exchange Area Telephone Cable—Aerial & Duct Type

Exchange Area Telephone Cable—Direct Burial Type

Rural Distribution Telephone Wire—.109 Inch Steel Support Wire

Rural Distribution Telephone Wire—.134 Inch Steel Support Wire for long span installations

Urban Distribution Telephone Wire—.109 Inch Steel Support Wire

Interior Telephone Cable

Drop Wire—Paralleled Figure 8

Drop Wire—Paralleled Reinforced

One-Pair Aerial Distribution Wire

Thermoplastic Station Wire

Polyethylene Insulated Bridle Wire

Buried Distribution Wire

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TELEPHONE WIRE & CABLE

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Behind the rugged dependability and high quality of Phelps Dodge telephone wire and cable are years of experience and research in the design and manufacture of communication cables.

Phelps Dodge pioneered the use of lead, paper, rubber and thermoplastics as applied to wire and cable. This valuable background of knowledge is combined by Phelps Dodge with highest grade materials and controlled craftsmanship in fabrication. The result is a complete line of reliable telephone wire and cable that helps reduce maintenance costs and provide longer in-life service.

Phelps Dodge will be glad to help you fill your wire and cable requirements. Get in touch with your nearest Phelps Dodge sales office.

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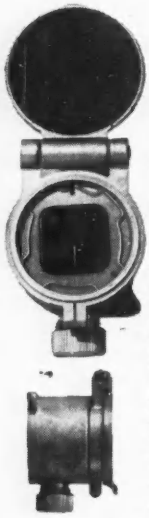
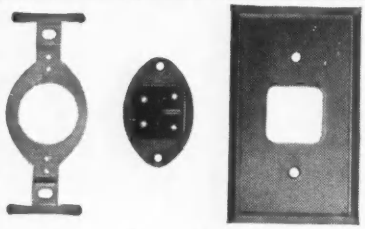
WHAT'S NEW AT SUTTLE



NEW Outdoor Weatherproof Jack Boosts Revenues!

Subscriber demands for outdoor, backyard or patio telephone service are growing fast. The new SE-16151 Outdoor Weatherproof Jacks from SUTTLE "fill the bill" for every outdoor use. The non-corrosive, waterproof aluminum receptacle houses the **REA accepted** SE-493A jack (above). This new jack makes an excellent extension sale-revenue booster. Another SUTTLE *quality* product at low cost. Order now from SUTTLE or your local distributor.

Price $6.50 each



REA accepted

SE-43A Bracket	SE-493-A Oval Jack	SE-19B Face Plate
$.28 ea.	$1.30 ea.	$.30 ea.

Modern Flush Outlet Installation

Use of the SUTTLE SE-493A Oval Jack with the SE-43A Bracket and SE-19B Face Plate permits flush telephone outlet installations. The SE-43A Bracket is holed to fit any standard conduit box, and is zinc-chromate plated to prevent rusting. Both ends of the SE-43A Bracket are heavily scored so that ears may be removed to fit any cover. Of non-shorting plastic materials, the SE-493A Jack and SE-19B Face Plate provide a modern, attractive appearance. All units are available direct from SUTTLE at Lawrenceville, Illinois or your local distributor in ivory, brown, and blue-beige colors.

SUTTLE EQUIPMENT CORP.

401 N. 15th St., Lawrenceville, Ill.
Phone: Lawrenceville 782
135 S. La Salle St., Chicago 3, Ill.
Phone: DEarborn 2-3108

"Off The Board"

Communications Securities

Markets as of May 16, 1960

	DIVIDEND	BID	ASKED	LAST SALE
American Tel. & Tel.	3.30			88¼
Anglo-Canadian Tel. (Brit. Col. & Dom. Rep.)	1.20	40	42	
Bell Tel. of Canada	2.20			46
British Columbia Tel.	2.20	45	47	
Calif. Interstate Tel. (Calif., Nev.)	.70	13¼	14¼	
Calif. Pac. Util. (Calif., Ore., Nev.)	.90	19	20½	
Calif. Water & Tel.	1.28	27¼	29	
Carolina Tel. & Tel.	1.60	38	40	
Central Elec. & Gas (Minn., Ill., Ia., Wis., Va.)	1.00	24½	26	
Central Telephone (Minn., Ia., N. C., Va.)	.88	20¾	22	
Chenango & Unadilla Tel. (N. Y.)	1.20	26½	28½	
Cincinnati & Suburban Tel.	4.50	88	92	
Citizens Utilities (Calif., Pa.) "A"	stk. only	13½	14½	
Citizens Utilities (Calif., Pa.) "B"	.52½	12⅝	13⅝	
Commonwealth Tel. Co. (Pa.)	.90	20¼	22	
Florida Telephone Co.	1.00	28¼	29½	
General Telephone & Electronics	2.20			84⅜
Hawaiian Telephone Co.	1.00	22	23½	
Indiana Telephone Co.	.50	22½ bid		
Inter-County Tel. & Tel. (Fla.)	2.00	68	73	
Inter-Mountain Tel. (Va. & Tenn.)	.80	15⅞	16¾	
Jamestown Telephone (N. Y.)	5.60	90 bid		
Lincoln Tel. & Tel. (Neb.)	2.60	63	66	
Lorain Tel. Co. (Ohio)	1.40	32½ bid		
Middle States Tel. Co. (Ill.)	1.00	26½	28½	
Mountain States Tel. (Ariz., Colo., Mont., Tex., etc.)	6.60			180½
New England Tel. & Tel.	1.72			34⅞
North Carolina Tel.	none	1	1¼	
Northern Ohio Tel.	1.60	49	52	
Pacific Tel. & Tel.	1.14			27¾
Peoples Tel. Co. (Pa.)	4.00	92 bid		
Pioneer Tel. Co. (Minn., N. D.)	1.00+stk	36	38	
Rochester Telephone (N. Y.)	1.00			24
Southeastern Tel. (Fla.)	.90	21½	23	
Southern New England Tel.	2.20	44	46½	
Southern Nevada Tel.	1.00	22½	24	
Southwestern States Tel. (La., Ark., Okla., Tex.)	1.20	24	25½	
Telephone Serv. Co. of Ohio "A"	2.80	132 bid		
Telephone Serv. Co. of Ohio "B"	2.80	140 bid		
Tidewater Telephone Co. (Va.)	1.40	25 bid		
United Utilities	1.40	39¾	41½	
West Coast Tel. (Wash., Ore., Calif.)	1.20	24½	26	
Western Union Telephone	1.40			45⅛
Western Utilities	.36	7¾	8¼	
Western Light & Tel. (Mo., Ia., Kans.)	2.00	43	45½	

(Source of market — DEAN WITTER & CO.)

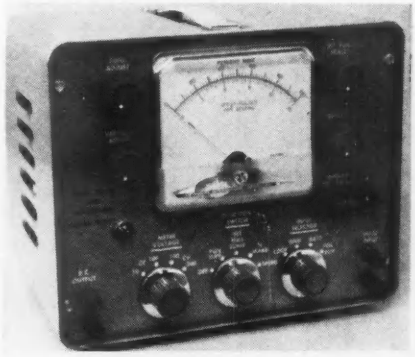
New Products' Showcase

SUPPLIES AND EQUIPMENT

By DICK REYNOLDS

Pulse Meter & Power Supply

AIRTRONICS International Corp. has announced available, as an extension of its line of telephone testing equipment, a Pulse Meter and Adjustable Power Supply, Model PMVPS-1. Designed as a instrument for use in the telephone equipment room, laboratory, factory, etc., unit can be used for checking the speed of square wave pulses, in the speed range of 0 to 15 pulses per second,



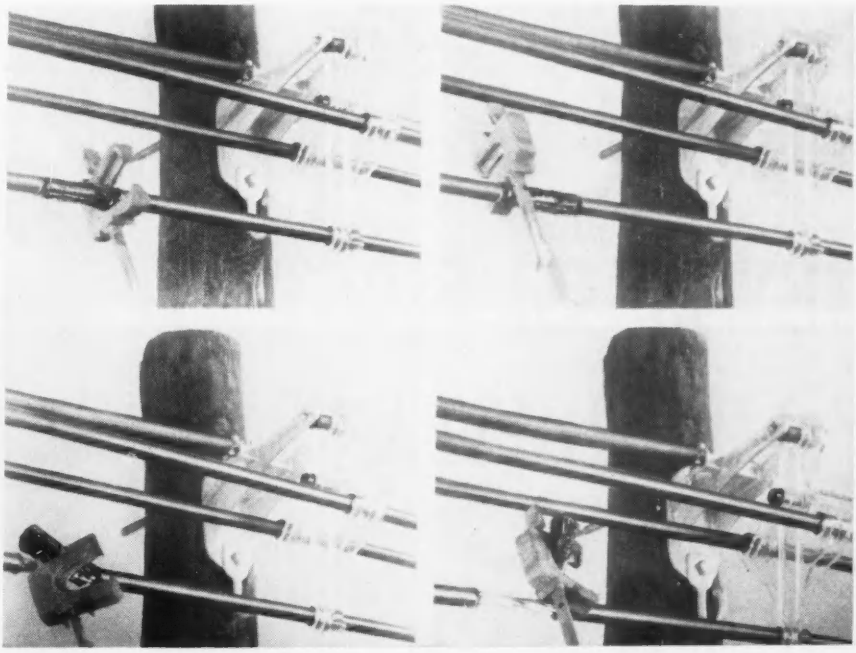
and the width of the active component of the square wave. The meter can accept loop, battery (48-50 volts), polar duplex (alternate resistance battery and ground), or carrier (resistance battery) pulsing.

In addition, it can be used as a light-duty power supply source which is continuously variable from 0 volts to 300 volts. A feature of the power supply is the smoothness of voltage control, particularly in the low-voltage ranges. *Check NP* 447.

Davis Pup Trencher

THE DAVIS Pup, self-powered, self-propelled and portable, digs two to three inches wide to a yard deep, or four inches wide to a half-yard in depth.

Driven by a six-speed winch mechanism, the Pup draws itself straight down the line the user wants dug. The user drives a stake at the point to where the Pup is to dig, hooks on the winch line and starts the rig working. When the Pup has started to dig, the user can take care of other work on the job.



HENDRIX WIRE & Cable Corp. has developed a new tool to strip thermoplastic insulation from power transmission cable. (Top Left) Modified V-shaped blade makes circular cut thorugh insulation to cable at each end of section to be stripped out; (Top Right) Blades on either end of V make linear cuts on section to be removed; (Bottom Left) Insulation is loosened from conductor with claw at end of tool; (Bottom Right) Insulation is stripped from conductor. The tool is 12 inches long, weighs about three pounds, made of a copper-tin-nickel alloy, and comes with an asbestos handling glove. *Check NP 448.*

Furnishing its own power and requiring no skilled operator, the Pup works effectively in hard ground,

heavy soil — wet or dry, gumbo and sand. The Pup is suited for underground electric and telephone lines, gas and water service lines, and other trenching jobs that call for a ditch between two and three inches wide and down to a yard deep, or four inches wide to a half-yard deep. *Check NP* 449.

Pocket Radio

GENERAL Electric Company has introduced a new all-transistorized shirt-pocket personal radio communications receiver with miniaturized circuitry that boosts audio efficiency. The new unit weighs only 12 ounces with battery. Although power consumption is reduced, the device is said by G-E to have receiver selectivity and receiver sensitivity comparable to mobile radios many times heavier and larger.

Designed for indoor and outdoor

WHEREVER THEY GO... THEY'LL GO FIRST BY LONG DISTANCE

They will, that is, if they take the advice in a current Bell System advertisement. Then they can enjoy vacation fun without a worry in the world.

All arrangements will have been made by Long Distance . . . reservations secured, a boat rented, stops planned along the route they'll travel. And while they're away, they can keep in touch with home and office by telephone.

This summer, families by the thousands will be on the move throughout the country. So reminding them of the many ways Long Distance can make their vacations more pleasant will stimulate calling in areas served by all telephone companies.

BELL TELEPHONE SYSTEM

Look for this cheerful scene in June issues of *Holiday*, *National Geographic* and *Sunset*.

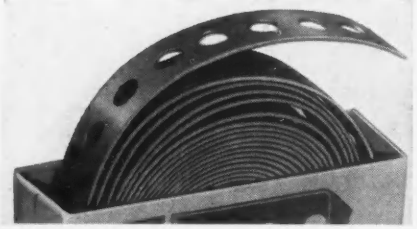
voice-paging to reach key personnel, the unit is engineered so the person wearing it may be contacted instantly by a base station transmitter, a two-way radio in a car, or by a portable unit operating on the same frequency. Initially, frequencies in the 150-174 mc. range will be used.

A directive horn, tiny and easily clipped to the wearer's lapel, is used

when privacy is not required and when loudness of the radio will not disturb others in the vicinity. Use of the "directed" voice speaker cuts the necessity for extra amplification in the receiver itself, aiding battery conservation and extending battery life. It is not necessary to hold the entire radio unit, nor the horn, to the ear to hear the message. *Check NP* 450.

Perforated Hanger Strap

PLAIN, galvanized or copper coated finishes are offered in a new line



of Perforated Hanger Straps, being introduced by Holub Industries, Inc.

The strap is made of a special gauge, coiled steel. It is easy to bend or twist to the desired shape and holds 500 lbs.

Three types of the strap are available in 10 ft. coils, bulk; 10 ft. coils, individually packaged in counter display box of 24; and in 100 ft. coils, bulk. The steel is 20 gauge. Edges are smooth to prevent cutting of fingers. *Check NP* 451.

Pole Inspection Kit from Chapman Chemical Co.

Pole Inspection Kit

A POLE Inspection Kit containing all accessory equipment necessary for ground-line inspection of utility poles is now available from Chapman Chemical Company.

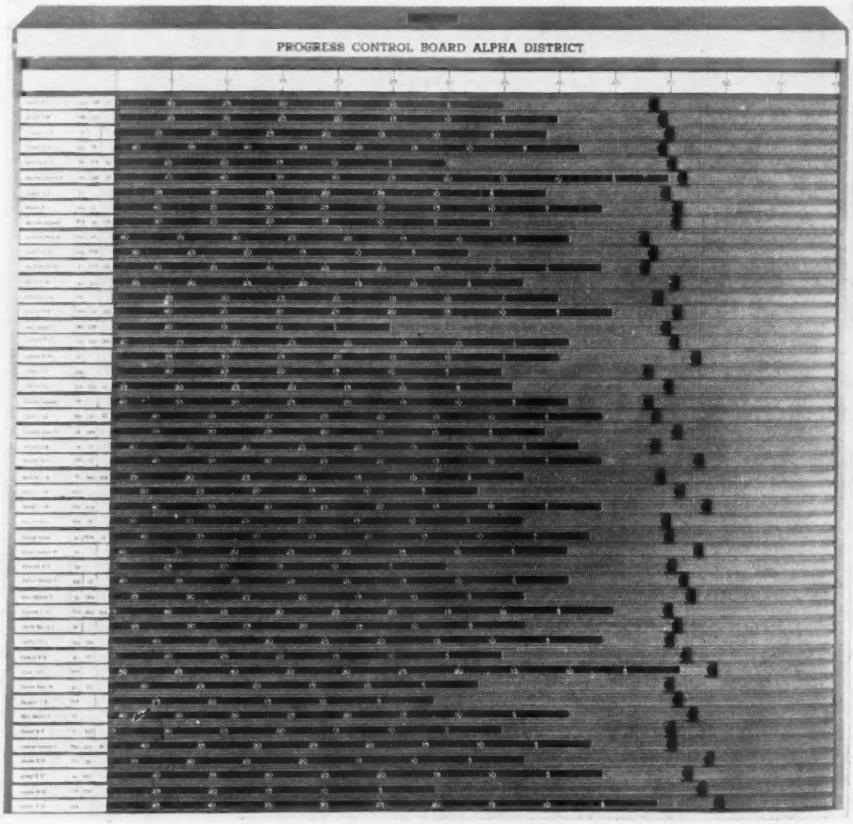
Included in the kit are the following items: 200 treated wood plugs, hammer head hatchet, stapling gun and staples, 8″ increment borer, 8-ft. steel tape, wire brushes, 10″ mortar trowel, waterless hand-cleaner, wiping cloth, and 200 Pol-Nu aluminum dating tags with aluminum nails.

All items in the kit are available on individual re-order for replacement. Handy re-order cards are provided with each kit. *Check NP* 452.

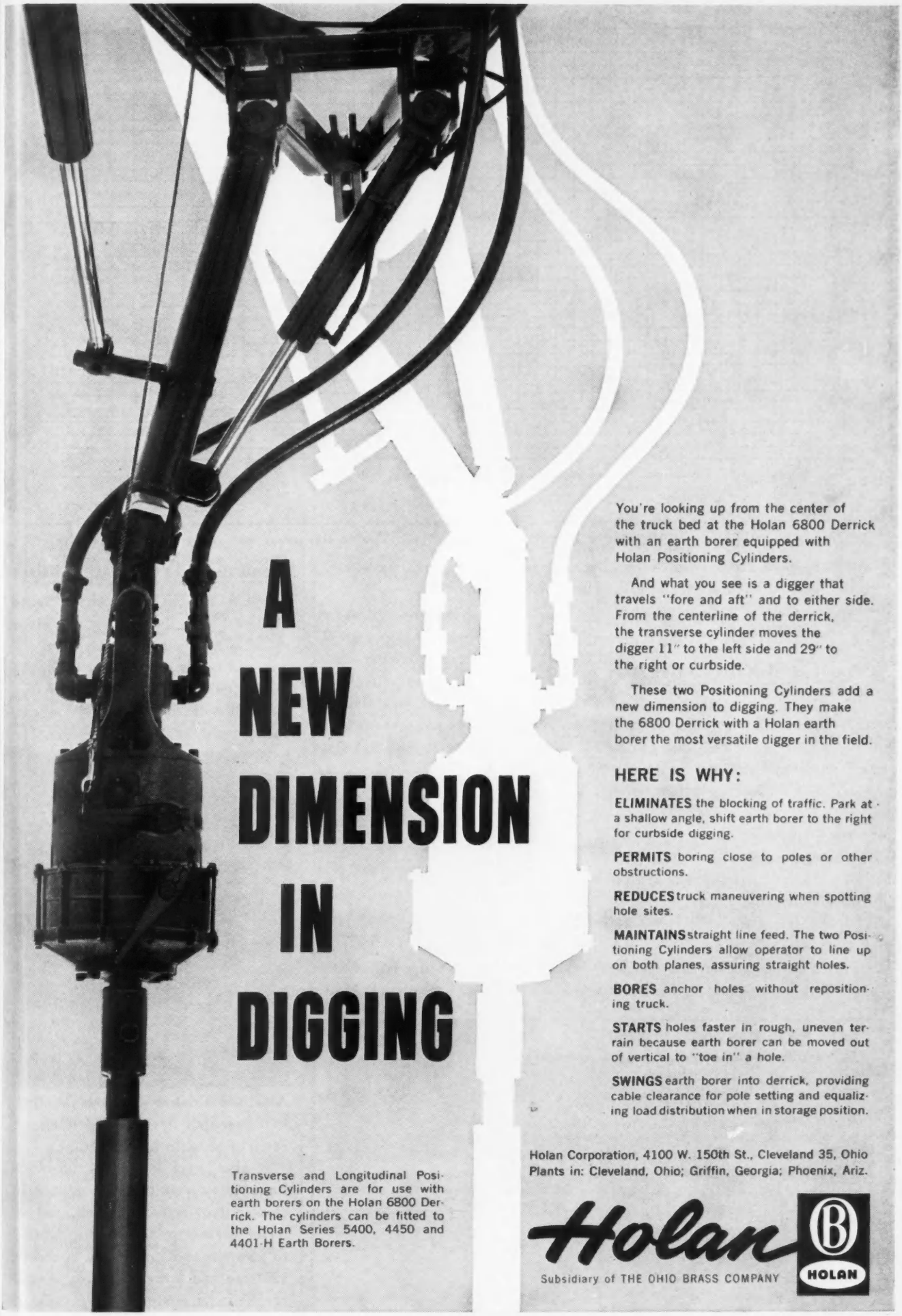
Progress Control Board

ACME VISIBLE Records, Inc. has announced a new Progress Control Board that tells the foreman at a glance how much work remains.

The control board is available in two sizes. The large size is equipped for twenty-three men and can be expanded to forty-eight. For smaller offices the panel comes equipped for



Progress Control Board from Acme Visible Records, Inc.



A NEW DIMENSION IN DIGGING

You're looking up from the center of the truck bed at the Holan 6800 Derrick with an earth borer equipped with Holan Positioning Cylinders.

And what you see is a digger that travels "fore and aft" and to either side. From the centerline of the derrick, the transverse cylinder moves the digger 11" to the left side and 29" to the right or curbside.

These two Positioning Cylinders add a new dimension to digging. They make the 6800 Derrick with a Holan earth borer the most versatile digger in the field.

HERE IS WHY:

ELIMINATES the blocking of traffic. Park at a shallow angle, shift earth borer to the right for curbside digging.

PERMITS boring close to poles or other obstructions.

REDUCES truck maneuvering when spotting hole sites.

MAINTAINS straight line feed. The two Positioning Cylinders allow operator to line up on both planes, assuring straight holes.

BORES anchor holes without repositioning truck.

STARTS holes faster in rough, uneven terrain because earth borer can be moved out of vertical to "toe in" a hole.

SWINGS earth borer into derrick, providing cable clearance for pole setting and equalizing load distribution when in storage position.

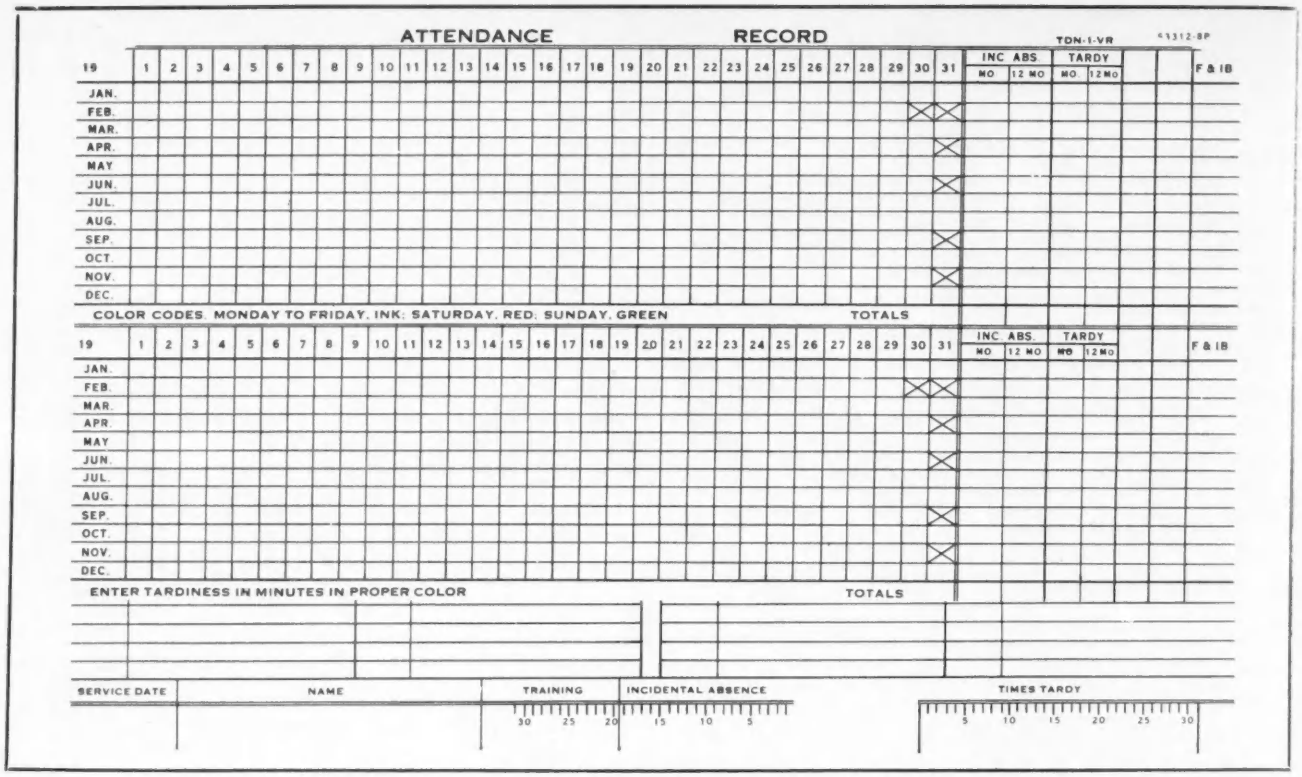
Transverse and Longitudinal Positioning Cylinders are for use with earth borers on the Holan 6800 Derrick. The cylinders can be fitted to the Holan Series 5400, 4450 and 4401-H Earth Borers.

Holan Corporation, 4100 W. 150th St., Cleveland 35, Ohio
Plants in: Cleveland, Ohio; Griffin, Georgia; Phoenix, Ariz.

Holan

Subsidiary of THE OHIO BRASS COMPANY

HOLAN



Attendance Record Card from Acme Visible Records, Inc.

thirteen men and expands to twenty-three. Each board is fully fitted with indicators, inserts and work load scale. *Check NP* 453.

Attendance Record System

THE Acme Visible central office employe attendance record system aids the chief operator and her assistants in handling absence and tardiness. These records are expressed uniformly on an annual rate basis for each employe.

Heart of the system is Acme Visible's 8 x 5 Card Form 63312-8P (see illustration above) filed in visible record equipment for easy reference and convenient posting. The card form arrangement provides visible signal indicators made of colored acetate which are easy to manipulate and understand.

Four visible signals: — Red and green sliding indicators shows graphically the absence and tardiness record, respectively, on an annual rate basis. A purple signal indicates one or more disability cases during the previous year. A yellow signal flags the groups of employes with less than one year's service.

The record of attendance is kept from the date of engagement or re-engagement for all regular and temporary employes. The cards, alphabetically arranged, are usually convenient to the Chief Operator's desk.

For detailed description of this time-saving system, *Check NP* 454.

Aluminum Telephone Booth

AN ALUMINUM telephone booth "tailored" for locations where floor space is at a premium has been announced by the Aluminum Company of America.

The booth is fabricated of corrosion-resistant Alcoa aluminum. The

Alumilite finish never needs painting. Pencil marks or smudges wash off easily with soap and water.

It also has a flush roof, an aluminum alloy patterned floor, a self-closing door assembly, shelf, and interior wiring for fluorescent lighting to give ample illumination. A ceiling vent fan and louvered bottom panels are optional equipment. *NP* 455.

NEW PRODUCTS' DEPARTMENT **6-1-60**
Telephone Engineer Publishing Corporation
7720 North Sheridan Road,
Chicago 26, Illinois

ATTN: Dick Reynolds

Please send me additional information concerning the following new products:

NP 447..... NP 448..... NP 449..... NP 450..... NP 451.....
NP 452..... NP 453..... NP 454..... NP 455.....

NAME..... POSITION.....

COMPANY.....

ADDRESS.....

CITY..... ZONE..... STATE.....

coming

CONVENTIONS

PENNSYLVANIA Tel. Assoc. Bedford Springs Hotel, Bedford Springs, Pa., June 6-8.

CALIFORNIA Tel. Assoc., Fairmont Hotel, San Francisco, Calif., June 8-10.

WASHINGTON-OREGON Tel. Associations, Sheraton Portland Hotel, Portland, Ore., June 16-17.

NEW YORK Tel. Assoc., Scaroon Manor, Schroon Lake, N. Y., June 20-22.

ALASKA Tel. Assoc., Elk's Club, Sitka, Alaska, August 15-17.

TENNESSEE Tel. Assoc., Hermitage Hotel, Nashville, Tenn., Sept. 7-8.

ARKANSAS Tel. Assoc., Hermitage Hotel, Hot Springs, Ark., Sept. 12-13.

MICHIGAN Tel. Assoc., Grand Hotel, Mackinac Island, Mich., Sept. 12-13.

ROCKY MT. Tel. Assoc., Hilton Hotel, Denver, Colo., Sept. 14-16.

WEST VIRGINIA Tel. Assoc., Morgan Hotel, Morgantown, W. Va., Sept. 19-21.

NEVADA Tel. Assoc., Hotel Nevada, Ely, Nevada, Sept. 21, 22, 23.

NEW ENGLAND Tel. Assoc., Mt. Washington Hotel, Bretton Woods, N. H., Sept. 25-28.

NATIONAL CONVENTION, Conrad Hilton Hotel, Chicago, Ill., Oct. 9-12.

SOUTH CAROLINA Tel. Association, Clemson House, Clemson, S. C., Oct. 24-25.

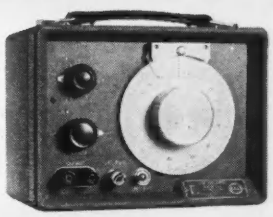
VIRGINIA Tel. Association, Roanoke Hotel, Roanoke, Va., Oct. 27-28.

HOW SENSITIVE ...HOW ACCURATE CAN A PORTABLE TEST METER BE?

CEC combines laboratory precision and field ruggedness in its government-approved 45-111 DBM/DBA Meter. Carry this completely portable 10-lb. instrument anywhere to measure signal and noise levels in telephone equipment and systems... measure power in 10 ranges from +30 to −90DBM and from +115 to −5DBA with F. S. accuracy of ±1db... make flat or F1A-weighted readings directly from a large calibrated scale.

The 45-111 uses low-current-consuming transistors and rugged printed-wiring circuits. Internal rechargeable batteries provide 24 hrs of continuous operation.

Other portable CEC test equipment includes this 45-220 Test Oscillator: Weighs only 7 lbs.... furnishes continuously variable frequencies in 4 bands from 15 cps to 150 kc; output is 2 volts rms at 10 ma.

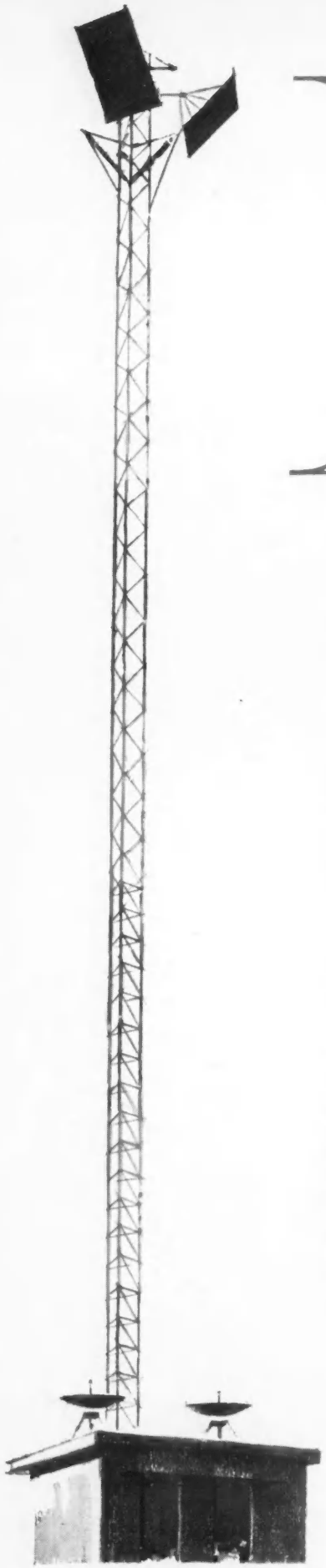


For complete information, write for Bulletin CEC 7002-X4.

Electro Mechanical Instrument Division

CEC

CONSOLIDATED ELECTRODYNAMICS / pasadena, california



Rx FOR COMMUNICATIONS SYSTEMS WITH GROWING PAINS!

DC-powered Collins microwave and carrier.

Collins now offers complete microwave and carrier multiplex systems capable of operating from a DC battery source. And because of the range of voltage combinations available with the new Collins equipment, you may choose the one that best integrates with your existing battery plant.

Check these advantages of Collins DC-powered microwave and carrier:

- ✓ Assures uninterrupted operation.
- ✓ Eliminates standby power equipment.
- ✓ Increases operating reliability.
- ✓ Reduces maintenance costs.
- ✓ Utilizes existing battery plants.

For information on how Collins may help you solve your own particular communications problem, contact Collins Radio Company, Texas Division Sales, 1200 N. Alma Road, Richardson, Texas.

COLLINS MICROWAVE AND CARRIER

COLLINS

COLLINS RADIO COMPANY • DALLAS, TEXAS • CEDAR RAPIDS, IOWA • BURBANK, CALIFORNIA

Staff Changes Announced By Calif. Water & Tel. Co.

FRED H. MacGougan, telephone division manager of California Water & Telephone Co. since 1947, will retire at the end of 1960, it has been announced by Chester H. Loveland, president. Bertram C. Probasco, 53, manager of the company's San Fernando district, will succeed Mac-

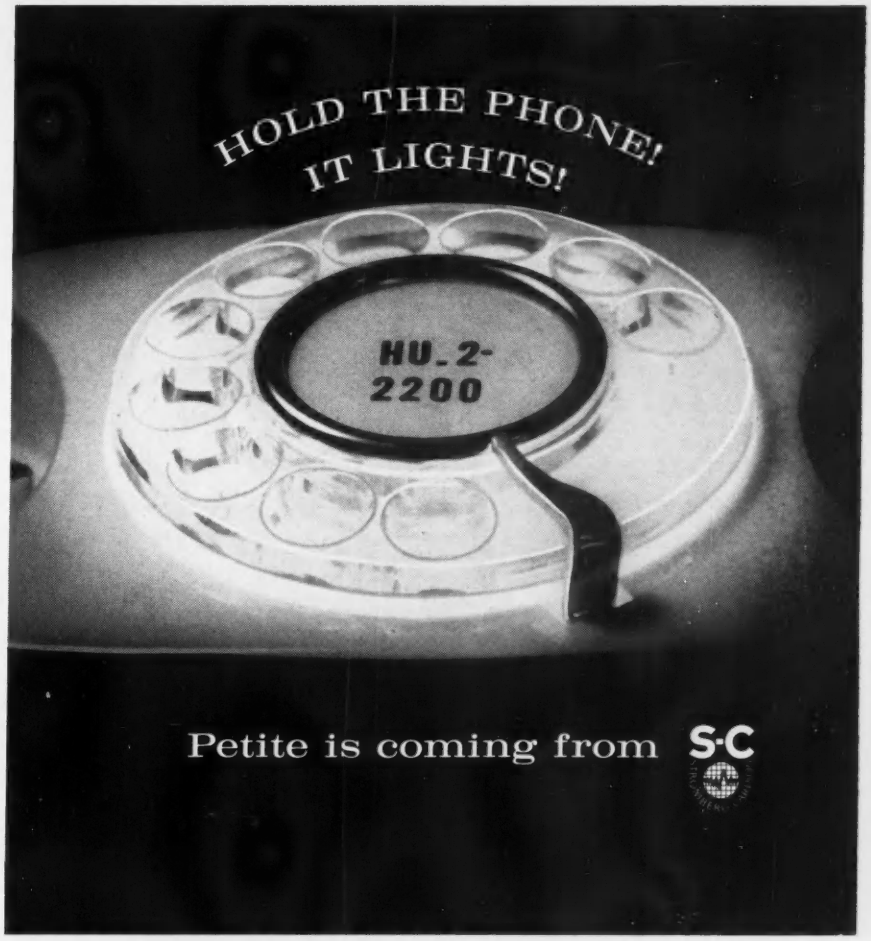
FRED H. MacGOUGAN

Gougan as division manager. Probasco will assume his new duties on June 1, and MacGougan will serve the remainder of the year in an advisory and consultant capacity.

At the same time, Loveland announced additional changes in the telephone division. Lee Allen, 52, who

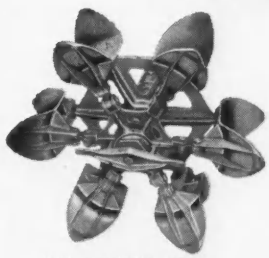
BERTRAM C. PROBASCO

is manager of the company's Redlands district, has been promoted to

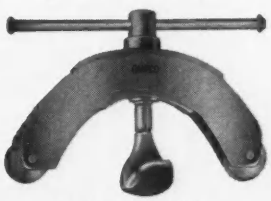


GENERAL MACHINE PRODUCTS COMPANY, INC.

Old Lincoln Highway at Pa. Turnpike, Trevose, Pa.



C-R POWER REEL



SLACK PULLER

CABLE FEEDER

GMPCO

AERIAL TENTS
CABLE BENDERS
CABLE BLOCKS
CABLE LASHERS
COAXIAL CABLE TOOLS
LASHING WIRE
CLAMPS AND GRIPS
PORTABLE & POWER REELS

Distributed by GraybaR ELECTRIC COMPANY

PRESSURE TESTING KIT

COMPOUND

B, C, D, E, & G CABLE LASHERS

Special Purpose Tools To Specifications — Catalog on Request

Over 600 various items of Line Construction Tools, Maintenance & Pressure-Testing Equipment in stock for immediate shipment

AE paystations are BUILT TO

ONE NICKEL WILL NOT WORK —
USE TWO NICKELS OR ONE DIME
1. LISTEN FOR DIAL TONE
2. DEPOSIT DIME OR TWO NICKELS
3. DIAL NUMBER DESIRED
Long Distance Calls—Dial
OPERATOR
COIN RETURN

AE *paystations give you* 6 *other important benefits:*

1. **Attractive.** Choice of 10 decorator colors.
2. **Full line.** Prepay, Local Prepay, Postpay and Semi-postpay.
3. **Replacement parts** always available from stock.
4. **Anti-stuffing device** prevents fraud.
5. **Standard mountings** fit all phone booths.
6. **Slug ejector** for 25¢ coin channel.

TAKE ABUSE!

Sturdy housing resists damage!

When you buy an AE paystation, you get a sturdy instrument which is engineered to resist damage. The entire housing is made of solid sheet steel. It stands up against the toughest handling by many customers, year after year.

Coin box door discourages burglars!

The coin box door is made of heavy sheet steel. It is so closely fitted to the housing that it's impossible to insert any tool. And, the door is case-hardened to resist drilling or prying.

For complete information about AE paystations, ask for our Paystation Catalog. Write Automatic Electric Sales Corporation, Northlake, Illinois. In Canada, Automatic Electric Sales (Canada) Ltd., 185 Bartley Drive, Toronto 16.

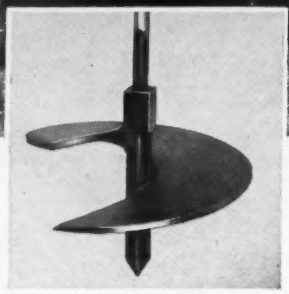
AUTOMATIC ELECTRIC

Subsidiary of

GENERAL TELEPHONE & ELECTRONICS

GENERAL SYSTEM

MECHANIZE SCREW ANCHOR INSTALLATION



You've got the means... your power hole-digging equipment. Use it to install Chance Screw Anchors in 5 to 8 man-minutes... *from the time the equipment is moved into position until the anchor is ready for the guy.*

Chance Power-Installed Screw Anchors, ranging from 78 to 176 square inches in area, go down fast into all types of soil (except extremely rocky soil). The sharp cutting helix of high-strength structural steel is tapered to minimize earth disturbance. And, hundreds of installations and pull tests prove these anchors hold more with less creep than any anchors of comparable size.

Your present power boring equipment, regardless of type, can be easily adapted to power anchor installations. Add to this equipment... the special wrench shown at right. It transmits torque from the power equipment directly to the specially designed hub on the anchor helix. Wrenches are made to fit all popular makes of earth borers. And, since the anchor rod is not subjected to torque, it only has to be heavy enough to support the guy load. That's a cost-saving factor too.

So, mechanize screw anchor installations. Install Chance Screw Anchors, and get:

Lower installation costs per anchor
Better utilization of expensive equipment
Greater holding power with less creep
Consistent results
Elimination of human variables and error
Less physical effort, better employee relations

Contact your Chance Representative. Now. He'd like to tell you more about mechanized anchor installation, show you test results and help you apply this new technique to save time, cut costs, and improve your anchoring.

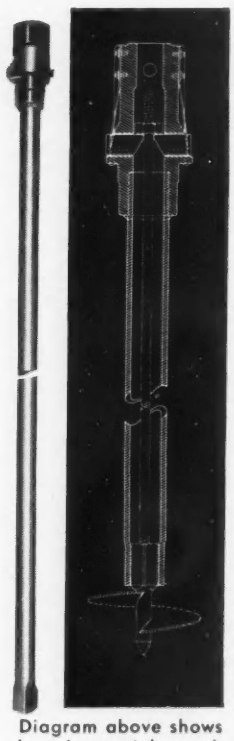


Diagram above shows how the special wrench fits the anchor. Wrenches are made to fit all popular makes of earth-borers.

ABC INDUSTRIES

A. B. CHANCE COMPANY
Centralia, Missouri
A. B. Chance Co. of Canada, Ltd., Toronto CA60-6

the newly created position of chief engineer, effective June 1. Allen will be responsible for all telephone engineering and plant activities.

Floyd G. McKeighen, 41, presently service superintendent of the company's San Fernando district, will succeed Probasco as district manager

FLOYD G. McKEIGHEN

on June 1. At the same time, Fred C. Hacquebord, 41, Redlands district equipment maintenance superintendent, will succeed Allen as Redlands district manager.

Fred MacGougan, who is retiring after nearly 50 years in the telephone business, started his career as a messenger and clerk at Spokane, Wash. In 1911, he joined the engineering department of the British Columbia Telephone Co. After serving in the Canadian Signal Corps during World War I, MacGougan went to work for the Northern Electric Co., and at the same time completed his engineering studies at McGill University. In succeeding years he served in a variety of capacities, including district manager for West Coast Telephone Co., an affiliate of California Water & Telephone Co. He moved to Monrovia in 1947 to become telephone division manager.

Probasco also has had a long and varied career in the telephone industry. He began at the age of 19 with The Southwestern Bell Telephone Co. in Kansas, working as a groundman, lineman and cable splicer. Later he served in similar capacities for the Kansas Telephone Co. and the United

States Telephone Co. in Missouri. At various times he was also local manager of these companies.

In 1946, after four years in the Signal Corps, Probasco was discharged as a lieutenant colonel. He then joined California Water & Telephone Co. as a commercial engineer and was instrumental in coordinating and expediting the complex activities involved in converting the San Fernando system from manual to dial operation. In 1948, he was made manager of the San Fernando district.

Allen joined California Water & Telephone Co. in 1941 as an instrument repairman. He later served as

LEE ALLEN

equipment installation supervisor before being appointed Redlands district manager in 1956. Before joining the company, Allen had worked with Western Electric in Los Angeles. He has also had extensive training in telephone engineering and technology, having completed the telephone engineering course at the University of California, the Pacific Telephone Company's telephone transmission course, and a special course in television at the American Telephone Laboratories in Chicago.

McKeighen joined the company in 1949 as an equipmentman. He later served as equipment engineer before being appointed service superintendent. McKeighen also worked for Western Electric as an installer and engineer and served five years in

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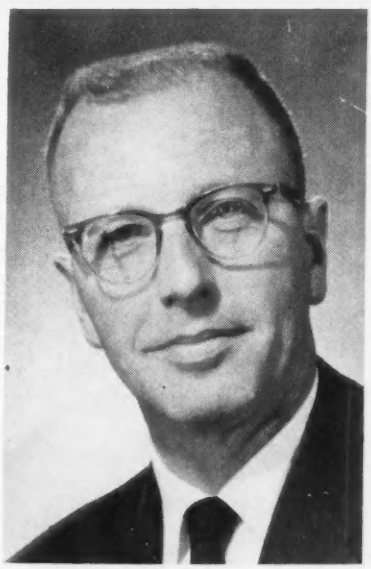

FRED C. HACQUEBORD

the Army Signal Corps, from which he was discharged as a captain.

Hacquebord has been with the company since 1946. He started as an equipment installer, then served as a central office equipment working foreman and chief switchman before being made district equipment maintenance superintendent in 1957. Before joining the company, Hac-

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quebord had served in the Army Signal Corps, as an instructor on dial telephone equipment for Western Electric, and as a central office repairman with the Pacific Telephone & Telegraph. Recently, in addition to his regular duties with California Water & Telephone Co., Hacquebord has been an instructor in supervisory training for Redlands personnel.

Orange County Tel. Co. Sets Up Scholarship Fund

A SCHOLARSHIP fund has been established and ratified by the union and management personnel of the Orange County Telephone Co., Middletown, N. Y., according to an announcement issued by Warren P. Kerrigan, president of Local 1948, International Brotherhood of Electrical Workers, and Ralph G. Dodd, telephone company commercial manager.

Committee members representing union and management personnel of the Orange County Telephone Co., Middletown, N. Y., discuss final plans for establishing a scholarship fund during a meeting held at the plant recently. Left to right (seated) are MRS. ETHEL TERWILLIGER, chief operator; RALPH G. DODD, commercial manager; and MRS. KATHLEEN KIERNAN, Local 1948. Standing — WARREN P. KERRIGAN, Local president; LEE I. HUNT, general manager; and JOHN J. LAWLER, Local 1948.

The scholarship fund is to be financed with the profits received from the sale of candy, soda and milk which is sold within the plant, according to Dodd. In addition, Dodd noted, the company board of directors and member of the local have made direct contributions to the fund.

Scholarship awards will be based on and will not exceed tuition paid

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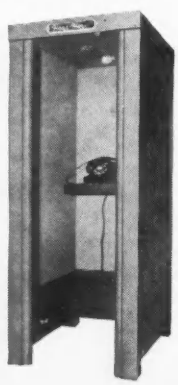

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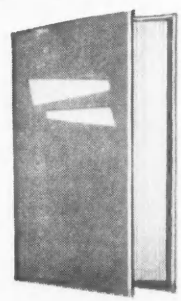

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ly resident students of Orange County attending Orange County Community College. General-type scholarships will be awarded based on scholastic ability, achievement, potential as a college student and character.

Only children of regular employes at the telephone company will be eligible for awards. Plans call for awarding two scholarships each year. They may be used at any college or accredited school of higher learning.

New Group Formed To Operate Missile Site System

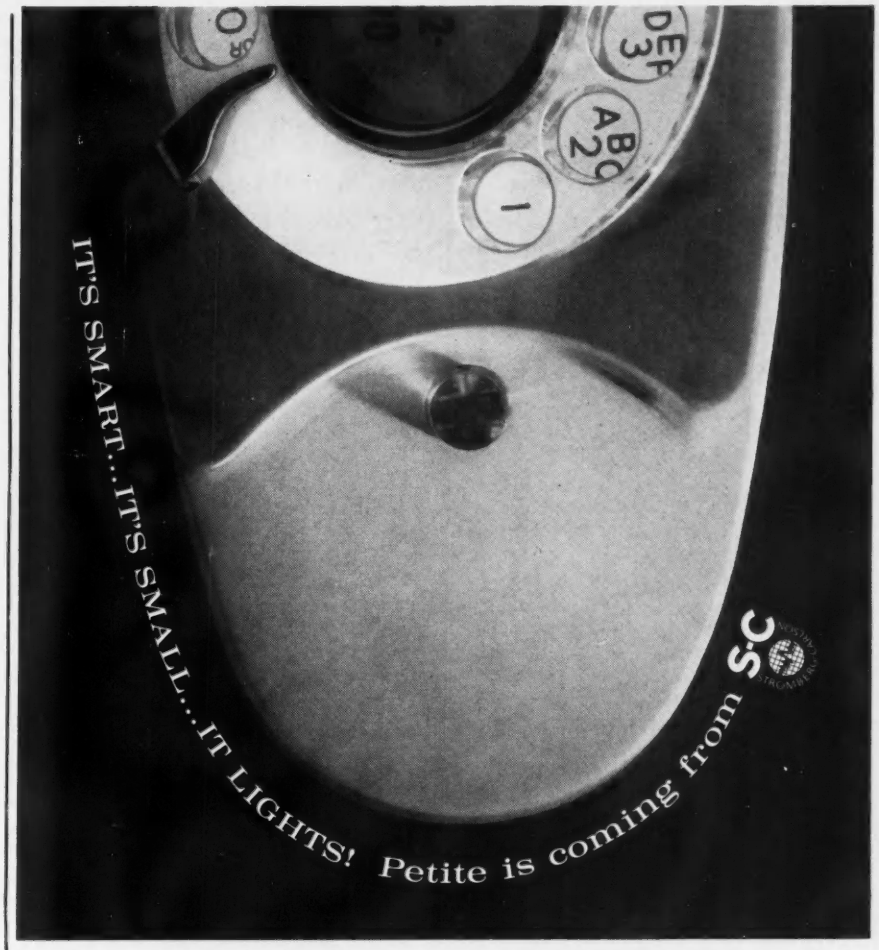
FIVE INDEPENDENT telephone companies, banded together as a single corporation, recently signed contracts totaling $6 million with Kellogg Switchboard & Supply Co., Chicago, for Inter-site communications in the Atlas missile complex. Kellogg is the communications division of International Telephone & Telegraph Corp.

The agreements provide that Kellogg will furnish and install cable and carrier circuitry to link Forbes Air Force Base near Topeka, Kans., with nine missile sites within a 50-mile radius of that city.

The telephone companies, functioning as Independent Telephone Association Inc., will operate the missile site network, providing maintenance and administration for the entire project under a prime contract received from the Air Force.

According to the contract, Kellogg will lay more than 500 miles of cable before the system is completed in 1961. First of the ICBM installations is due to become operational before year's end. When fully operational the inter-site communications for Atlas will tie into the national defense network.

Representing Kellogg at the signing was its president, George A. Strichman; Gene Gault, project manager for the Independent telephone companies, represented that group. Participating companies are W. E. G. Dial Telephone Co.; Reno Telephone Assn., Inc.; Northern Kansas Telephone Co.; Wamego Telephone Co.; and United Telephone of Kansas, Inc. With the exception of the latter, all these companies are REA financed.



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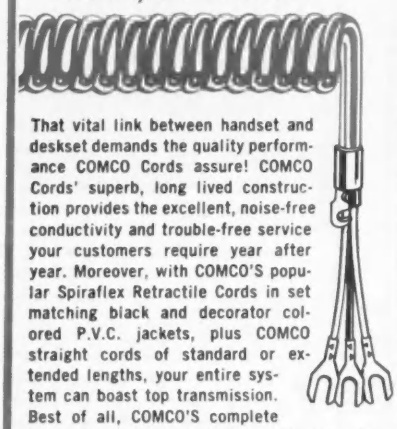

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Altec-Lansing Forms National Sales Organization

ALTEC LANSING CORP., Anaheim, Calif., has announced the formation of a national sales organization to provide sales and engineering assistance for telephone equipment customers, according to Alvis A. Ward, president of Altec Lansing.

This national sales organization will be divided into 10 areas with a regional salesman in charge of each area. The organization, states Ward, will eliminate the two-step distribution system.

H. S. Morris, present sales manager of Altec Lansing, will be in charge of the new organization.

All salesmen, according to Ward, will have experience in industrial communication systems. Present system of distributing Altec products through Graybar Electric Co. will be discontinued effective June 30, 1960.

Bell & Howell and CEC Merge Research Facilities

THE COMBINING of the research activities of Bell & Howell Co., Chicago, and its California subsidiary, Consolidated Electrodynamics Corp., into a single, expanded research division has been announced by Charles H. Percy, president.

Percy said the newly formed corporate research division will have 30 percent more personnel than the two previous departments. "The merger of Bell & Howell and CEC has enlarged our research goals far beyond those of the two separate firms," he explained.

The research division will be located at CEC's headquarters in Pasadena, Calif., and will be responsible to Philip S. Fogg, president of CEC.

Percy also announced the appointments of Dr. Charles F. Robinson as director of research, John G. Heiland as associate director, and Dr. Kenneth W. Gardiner as assistant director of the combined division.

N. A. Toalson Named President, A. B. Chance Co.

NATHAN A. TOALSON has been elected president of the A. B. Chance Co., Centralia, Mo. He will succeed F. Gano Chance, who will continue as senior officer, chairman of the board and chairman of the executive committee. Toalson has been executive vice president of the power and communication equipment manufacturing firm since 1956.

NATHAN A. TOALSON, left, succeeds F. GANO CHANCE, right, as president of the A. B. Chance Co. In background, photo of the founder of the company, the late A. B. Chance.

Chance also announced the appointment of L. C. Hansen as vice president and general manager of the Chance Division, largest of the company's three major divisions. Hansen will direct marketing, manufacturing and engineering functions of the company's Centralia, Mo., Pittsburgh, San Francisco and Parkersburg, W. Va. operations. Hansen has been vice president of marketing since 1955.

The board of directors also elected C. C. Hough as vice president and treasurer, and Joseph M. Arndt as vice president of industrial and public relations.

Three other A. B. Chance Co. promotions were also announced. G. M. Daly has been advanced to sales manager; J. S. Curtright to regional vice president heading a new sales region serving several central states; and Charles Rootes to controller.

Harold W. Wittenborn Elected Vice-Pres., Cook Electric Co.

DIRECTORS of Cook Electric Co., Chicago, have elected Harold A. Wittenborn as vice-president, personnel and industrial relations.

Wittenborn joined Cook Research Laboratories in 1947 as a technician.

Superior Cable Buys Supa Insulations, Inc.

SUPA INSULATIONS, INC., Rocky Mount, N. C., has become a wholly-owned subsidiary of Superior Cable Corp., Hickory, N. C., according to James L. Robb, president of Superior Cable.

Supa specializes in the manufacture of "Teflon" insulated wires and cables. (Teflon is DuPont's trademark for Polytetrafluoreothylene.) According to Robb's statement, the addition of the Supa high temperature products rounds out Superior Cable's line of wires and cables for the aircraft, missile, and electronic industries.

Supa products will continue to be marketed under the same name. The Supa sales force has been merged with that of Superior Cable Corp., under the direction of J. H. Bowman, vice president in charge of sales, and D. W. Hoffman, sales manager of the control cables division.

W. O. Chamberlin, Jr., Joins Cook Technological Center

W. O. CHAMBERLIN, Jr., has been named director of advanced planning, Cook Technological Center, Morton Grove, Ill.

Prior to joining Cook Electric Co., Chamberlin was Dayton representative for Hughes Tool Co., Culver City, Calif.

North Names Jefferson S. E. Sales Representative

JOSEPH P. JEFFERSON has been named Southeastern sales representative for North Electric Company's Telecom division, M. G. Ryon, division sales manager, has announced.

Jefferson has been sales promotion manager for the Telecom division since August, 1958. Prior to that, he was sales representative for North's industrial division. One of Jefferson's major projects as sales promotion manager was to re-orient Ericofon promotions in the direction of sales aids and merchandising programs for telephone companies. He also directed the revision of equipment schedules and specifications for XX-2 crossbar systems and AuTollizer toll ticketing systems.

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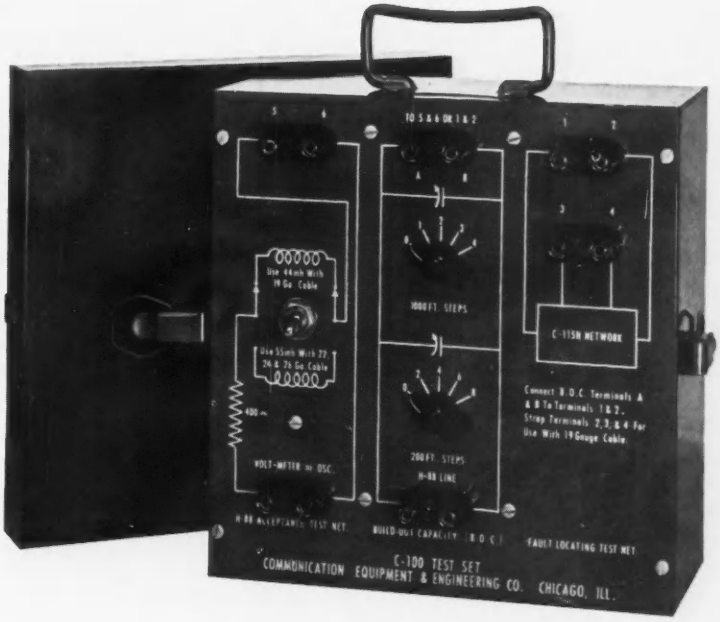

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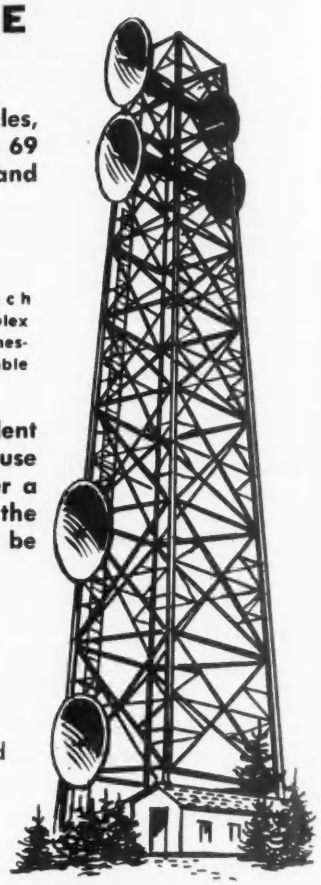

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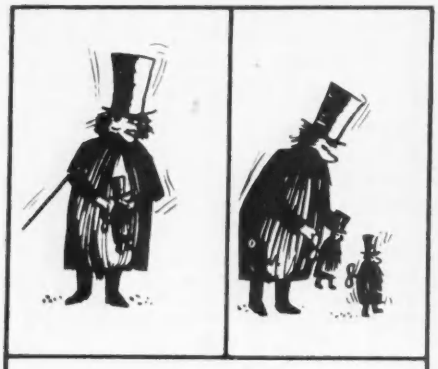

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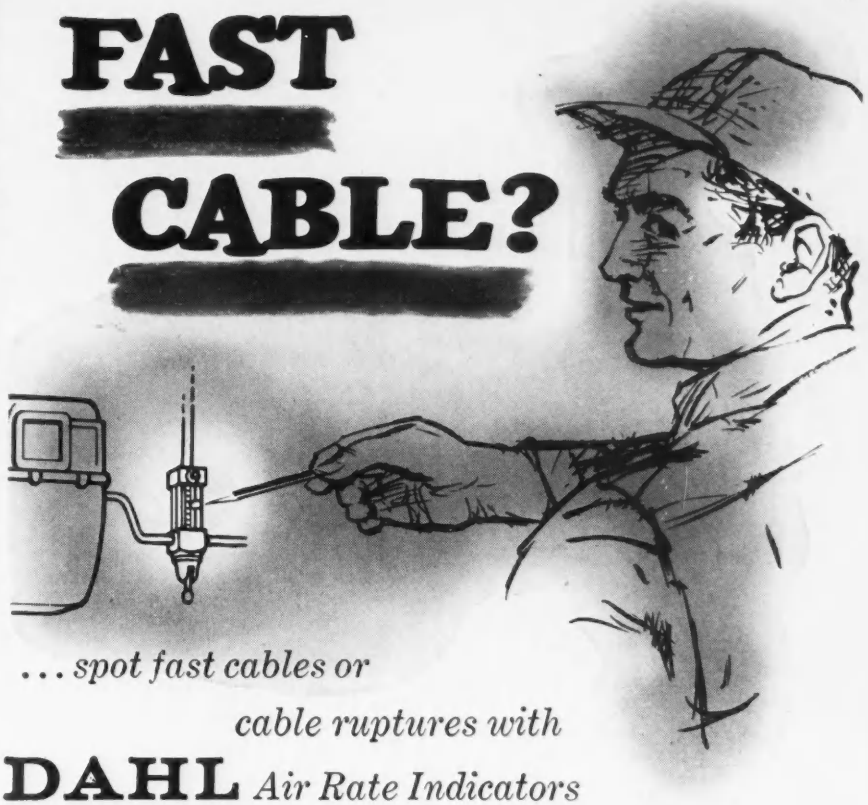

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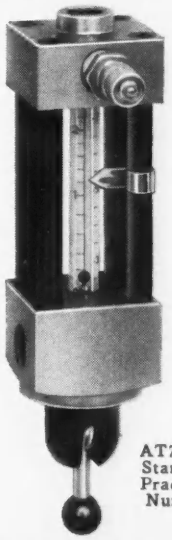

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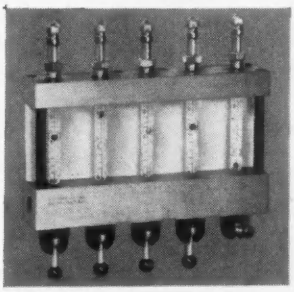

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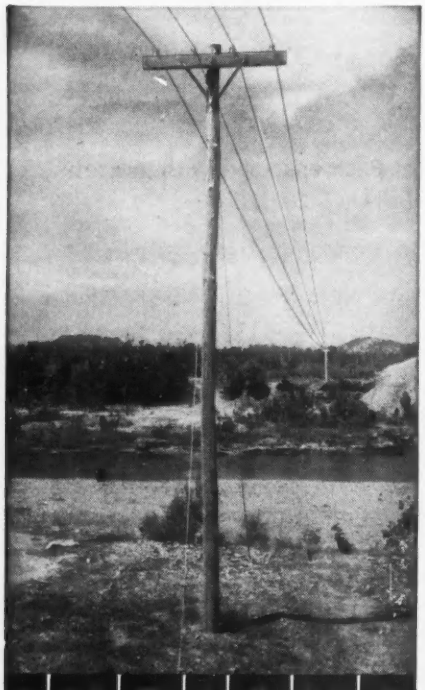

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THE BACK OF THE BOOK

By JOHN G. REYNOLDS

Golden Wedding Anniversary

MOST OF the citizens of Montezuma, Iowa, and visitors from far and wide called upon the *Clyde McFarlins* on Saturday, April 16. Messages, including one from President Eisenhower, poured in by telegraph and telephone, congratulating this respected and beloved couple on their 50th wedding anniversary. Their son, *Norman*, was home from Washington, D. C. for the occasion. *Bill Miller* and *Frank Carroll*, secretary and director of the Iowa State Independent Telephone Association, presented Mr. and Mrs. McFarlin with 50 hi-fi records from the Association.

Prediction

FOSTER McHENRY, USITA's current president from the "show-me" state, is doing just that as he makes his convention tour. Foster's two sons, *John* and *Jim*, are taking turns accompanying him these days and leaving the others at home to tend shop. This writer predicts that *John* or *Jim McHenry* will be president of the USITA along about 1980.

Look-a-likes

MYRTLE DRAHOS, convention girl for the Omaha (Neb.) Chamber of Commerce, and *Mayme Workman* are true "look-a-likes." Many suppliers and manufacturing representatives received a shock when they registered at the Nebraska Convention and first faced *Miss Drahos*. They thought she was *Mayme* and many registrants could not resist greeting her with "*Hello Mayme.*"

That Cowed 'Em

THE editor of the *Neodesha (Kan.) Sun* recently told his readers about the early days when telephone construction men were pushing long distance lines across the state, and the farmer who discovered about 20 men placing poles in his fields. He ordered the men off, but they refused to go. Instead, one of them showed him a legal paper authorizing them to set the poles.

The farmer studied the paper and walked away without comment. He hadn't given up, though. He went to his barn and turned loose a mean-tempered bull which charged the telephone crew.

As the men fled, the farmer shouted, "*Show HIM your paper.*"

Nosy Era Ends

THE PARTY line is another bit of Americana fast disappearing to urbanization. Last month the Illinois Bell Telephone Co. discontinued offering eight-party rural service in 31 Chicago area exchanges. By July 1, Illinois Bell will end its existing four-party urban service in the state.

This is a far cry from the early days of the telephone when there was a strong campaign to get party line subscribers. In those days before the turn of the century the party line carried up to 20 subscribers and service sold for $1. a month.

WARREN - best in battery chargers

The best things (including battery chargers) come in smaller packages these days

The Warren 48 TFR 100 shown here occupies one third the space, packs just a bit more than half the weight of other battery chargers of equal rating (100 amps).

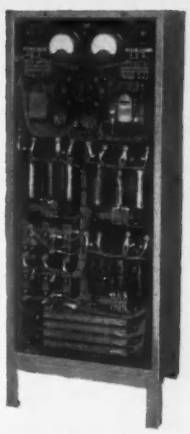
That's what semi-conductor design does for the modern telephone exchange these days. Gives you an automatic, full float, silicon type battery charger that's more compact, lighter, easier to install, and positively *frugal* on floor and rack space.

Now, ordinarily we might be tempted to add that — together with this space saving feature — you get equal performance and life as compared with other battery chargers.

But, strictly speaking, that's not true. In terms of performance and life, Warren TFR's are not *equal* to other battery chargers.

They're better.

Let us send you full information.



Compact, transistorized, field-proven Warren TFR's are available in a full range of current ratings in 24, 48, and 130 volt models. Illustrated: 48 TFR 100

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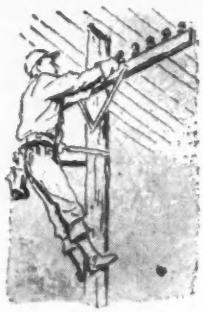

Place the loop of this Nicopress Deadend over the insulator... insert line wire in sleeve, compress with standard Nicopress Tool... and a uniformly-strong deadend is quickly made.

Available for copper and copperweld wires with full-round stainless steel bails; available for galvanized steel wires with full-round galvanized steel bails.

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